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THE AMERICAN GAS LIGHT JOURNAL

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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICE—
The American Gas Light Association's Greeting to European Gas Engineers 181

EDITORIALS—
Special Editorial Correspondence Respecting the Organization Meeting of the Pacific Coast Gas Association 181
Death of Mr. Edward Jones 182
Initial Meeting of the Pacific Coast Gas Association—Official Report—Revised by the Secretary 182
First Day—Morning Session—Constitution and By-Laws—Roll Call—Election of Officers—Reading the Communications—Afternoon Session—Discussion on the Paper Read by Mr. Hallett—The Question Box—No. I.—What is the Name of the New Japan Coal, and What is Its Value in Gas and Coke?
Cement for Steam Pipes 185
*Hearne's Center Seal 186
Something More about the New River Coal Fields, by Mr. E. C. Pechin 187
Report of the Pennsylvania Commission Appointed to Investigate the Subject of Anthracite Coal Waste 188
The Permeability of Glass 190
The Commercial Production of Ozone 191
ITEMS OF INTEREST FROM VARIOUS LOCALITIES 191
Seal of the Pacific Coast Gas Association—The "Family" Does the Stoking!—The South Framingham (Mass.) Gas Rate—Death of Mr. P. E. De Mill—Mr. Benedict on Rumors Connected with Chicago Gas—Movement for a Reduction in the Charlestown (Mass.) Gas Rate—Experimenting at Cambridge, Mass.—To Value the Water Plant of the Macon (Ga.) Gas and Water Company—Why Buffalo's Gas is not Tested—Mr. Tod Resigns the Presidency of the Youngstown (Ohio) Company—Obituary, Socrates Newman—Little Giant Generators Placed at Gainsville, Fla., and Clifton Springs, N. Y.—Hingham, Mass., to Operate an Electric Light Plant—Death of Mr. Edward Byrne—Improvements at Oakland, Cal.—And Other Items.
The Market for Gas Securities 194

[OFFICIAL NOTICE.]

The American Gas Light Association's Greeting to European Gas Engineers.

AMERICAN GAS LIGHT ASSOCIATION, OFFICE OF SECRETARY, PROVIDENCE, R. I., June 5th, 1893.

To the European Gas Engineers—Greeting: The American Gas Light Association will hold its 21st annual convention in the city of Chicago, beginning on the date of Wednesday, October 18th, 1893. It would give the members of the Association great pleasure to meet there as many of the European gas engineers and managers as can make it convenient to be in attendance at the World's Fair at that time. It is suggested that all contemplating visiting the Fair arrange their visits so as to be in Chicago, if possible, at the time of this convention, when they will be most cordially welcomed by the Association and invited to attend the sittings of the body and participate in its discussions of papers presented.

Those engineers who cannot conveniently visit the World's Fair at that time, but must choose some other date, are respectfully requested to send their names and addresses, as soon as they arrive in America, to the AMERICAN GAS LIGHT JOURNAL, No. 32 Pine street, New York City, so that a committee from the Association may be made aware of their presence, and when they may be met, so that they may form the acquaintance of their professional brethren in this country and be made to feel less like a "stranger in a strange land."

A. E. BOARDMAN, President.

A. B. SLATER, JR., Secretary.

SPECIAL EDITORIAL CORRESPONDENCE RESPECTING THE ORGANIZATION MEETING OF THE PACIFIC COAST GAS ASSOCIATION.

SAN FRANCISCO, CAL., July 24, 1893.

Dear JOURNAL: The new Pacific Coast Association is an assured success, and its future is bright and full of promise. Much has been said of the "Mid July" meeting of the infant Association, which would lead a Californian to infer that our Eastern brethren believe that when we are picking figs and prunes, apricots and olives, we must be sweltering in a torrid heat. With this in mind I stormed the castle of our local forecast official and requested an attested copy of the hourly temperature observations for the two days of the meeting, and here are the figures, which I believe should form a preface to any description of our meeting:

Tuesday, July 11th—

1 A.M.,	55 degrees.		9 A.M.,	53 degrees.		5 P.M.,	69 degrees.	
2 "	54 "		10 "	56 "		6 "	71 "	
3 "	54 "		11 "	59 "		7 "	66 "	
4 "	54 "		12 noon,	62 "		8 "	64 "	
5 "	53 "		1 P.M.,	65 "		9 "	64 "	
6 "	53 "		2 "	69 "		10 "	64 "	
7 "	53 "		3 "	67 "		11 "	60 "	
8 "	53 "		4 "	68 "		12 "	58 "	

Wednesday, July 12—

1 A.M.,	57	degrees.	9 A.M.,	55	degrees.	5 P.M.,	63	degrees.
2 "	56	"	10 "	58	"	6 "	65	"
3 "	57	"	11 "	62	"	7 "	62	"
4 "	57	"	12 noon,	64	"	8 "	60	"
5 "	56	"	1 P.M.,	63	"	9 "	60	"
6 "	56	"	2 "	62	"	10 "	58	"
7 "	55	"	3 "	62	"	11 "	56	"
8 "	56	"	4 "	62	"	12 "	56	"

The mean temperature of the two days was 58½°, the minimum 53°, the maximum 71°, and the range 8°, and this under a cloudless sky. So well was it demonstrated that summer in San Francisco is cool and invigorating, that it was unanimously voted to hold the annual meetings of the Association on the third Tuesday and Wednesday in July.

Over 40 of the representative gas men of the Coast assembled in the large stockholders' room of the San Francisco Gas Light Company at 10 o'clock, A.M., Tuesday, and, after the preliminaries of organization, unanimously elected Mr. J. B. Crockett President, Mr. J. L. Hallett, of Portland, Oregon, Vice President, Mr. John A. Britton, of Oakland, Cal., Secretary and Treasurer, who, together with Mr. F. H. Eichbaum, of San Francisco, Mr. John Mather, of Seattle, Wash., Mr. John Kaneen, of San Rafael, Mr. John Kempf, Jr., of Salt Lake City, Utah, form a Board of Directors.

It did not take long to discover the wisdom of the infant Association in the choice of its President, and the gavel of President Crockett acted as a loadstone which attracted all the gas men of the Coast to it and each other. These men, who were comparative strangers, in one short hour found chords of sympathy and harmony of thought drawing them into friendships which will be lasting and productive of good results.

The roll of membership has 54 names, representing Gas Companies in every part of the Coast, and the need of an Association of this kind, and the active interest taken in its inauguration was manifested by the total annihilation of distances; for instance, San Diego, California, and Fairhaven, Washington, are 1,678 miles apart, and Salt Lake City, Utah, is 870 miles from San Francisco, yet representatives from these places were present at the meeting.

The papers were well discussed, and the Question Box was teeming with questions, which brought out a great deal of information and many new facts.

Memorial remarks were made and resolutions passed on the death of Mr. Peter E. De Mill, who was formerly Superintendent of the San Jose Gas and Electric Light Company, and was to have been an active member of the new Association.

In the evening the Association was tendered a complimentary banquet at the Maison Riche, and amid flowers and soft music of mandolins and guitars and witty repartee the new Association, which had just been launched on the sea of life, tested its capacity for carrying a load and proved seawarthy, for no amount of Moet et Chandon or Brut Imperial could list it to starboard or port.

President Crockett proved himself a born toastmaster, and our model in the East must look to his laurels, for we have on the Pacific Coast a gentleman who can say good things himself and is brimming full of wit and good stories and can make those around him at ease and bring out the best there is in them.

Wednesday, the 12th, was spent in sight seeing, and the members enjoyed a sail on the bay, a visit to the Union Iron Works, the Potrero Station of the San Francisco Gas Light Company, and finally steamed out toward the Golden Gate to the New North Beach Station, where lunch was served in the meter room, and the afternoon was spent in examining the new plant.

Votes of thanks were tendered to the Union Iron Works for their kindness in furnishing the steamer Rockaway and exhibiting their works to the members, and to the San Francisco Gas Light Company for entertaining the members of the Association.

Amid the blowing of steam whistles and the cheer of the Association —" P. C. G. A.!—P. C. G. A.!—P. C. G. A.!"—the first meeting of the Pacific Coast Gas Association came to a close. Next year we meet at Sacramento, Cal., by invitation of Hon. Benj. Steinman, Mayor of Sacramento, and President of the Capital Gas Company, and we anticipate a profitable and pleasant meeting. Yours faithfully, PHOTOS.

DEATH OF MR. EDWARD JONES.—Mr. Edward Jones, formerly prominently identified with the management of the South Boston (Mass.) Gas Company, died on August 1st. The funeral services were celebrated on the 3d inst. Deceased, who was one of the pioneer gas engineers of America, was the father of Mr. E. C. Jones, of the San Francisco Company. In due time a sketch of his life will be printed by the JOURNAL.

[OFFICIAL REPORT—REVISED BY THE SECRETARY.]

INITIAL MEETING OF THE PACIFIC COAST GAS ASSOCIATION.

HELD AT THE OFFICES OF THE SAN FRANCISCO GAS LIGHT COMPANY, JULY 11TH AND 12TH.

FIRST DAY—MORNING SESSION.

Mr. J. B. Crockett, President of the San Francisco Gas Light Company, called the meeting to order and made the following remarks: Gentlemen—I only wish to open this meeting by saying that we are very much pleased to see so many here. We will proceed at once to business and effect a permanent organization. A temporary Chairman should be elected.

Mr. Hallett, of the Portland Gas Company, Portland, Ore., placed Mr. Crockett in nomination for Chairman, and Mr. John A. Britton, of the Oakland Gas Light and Heating Company, Oakland, for Secretary. The motion was duly seconded and was then put by Mr. Hallett, and carried unanimously. On motion the body was then organized, to be called the Pacific Coast Gas Association, the motion being carried unanimously.

CONSTITUTION AND BY-LAWS.

Messrs. J. L. Hallett, of Portland, C. O. G. Miller, of San Francisco, and John Kempf, Jr., of Salt Lake, were appointed a Committee on Constitution and By-Laws. Said Committee retired and soon returned with their report, which having been read by the Secretary, was taken up Article by Article, after which the Constitution as read was adopted as a whole.

The third Tuesday and Wednesday of July of each year was fixed for the Annual Meeting, and the By-Laws as read were adopted as a whole.

ROLL CALL.

J. B. Crockett, San Francisco Gas Light Company, San Francisco.
F. H. Eichbaum, Pacific Gas Improvement Company, San Francisco.
C. O. G. Miller, Pacific Gas Improvement Company, San Francisco.
Wm. G. Barrett, San Francisco Gas Light Company, San Francisco.
M. C. Osborn, Virginia City Gas Company, Virginia City, Nev.
C. W. Quilty, San Jose Light and Power Company, San Jose, Cal.
G. I. Kinney, San Diego Gas and Electric Light Co., San Diego, Cal.
O. M. Gregory, San Jose Light and Power Company, San Jose, Cal.
J. Clements, Red Bluff Gas and Electric Light Company, Red Bluff, Cal.
J. E. Gannon, City Gas Inspector, San Francisco.
J. W. Thomas, Vallejo Gas Light Company, Vallejo, Cal.
J. P. Berry, Santa Rosa Lighting Company, Santa Rosa, Cal.
Frank A. Cressey, Modesto Gas Light, Coal and Coke Co., Modesto, Cal.
John Kempf, Jr., Salt Lake and Ogden Gas and Electric Light Company, Salt Lake and Ogden, Utah Territory.
B. U. Steinmann, Capital Gas Company, Sacramento, Cal.
J. C. Pierson, Capital Gas Company, Sacramento, Cal.
Henry E. Adams, Stockton Gas, Light and Heat Company, Stockton, Cal.
Richard Fenner, San Francisco Gas Light Company, San Francisco.
E. P. Grant, Modesto Gas Light, Coal and Coke Company, Modesto, Cal.
Samuel Guthrie, San Francisco Gas Light Company, San Francisco.
A. J. Vanderwhite, Pacific Gas Improvement Company, San Francisco.
M. G. Elmore, Pacific Gas Improvement Company, San Francisco.
Thos. D. Petch, Eureka Gas Company, Eureka, Cal.
G. W. Wilson, Vallejo Gas Light Company, Vallejo, Cal.
N. Wylie, Carson City Coal Gas Company, Carson City, Nev.
T. R. Parker, Napa City Gas Light and Heating Co., Napa City, Cal.
H. P. Goodman, Napa City Gas Light and Heating Co., Napa City, Cal.
C. M. Converse, San Francisco Gas Light Company, San Francisco.
John F. Scott, Union Iron Works, San Francisco.
W. S. Wharton, Bellingham Bay Gas Company, Fairhaven, Wash.
John S. Kaneen, San Rafael Gas and Electric Company, San Rafael, Cal.
William Dunbar, San Francisco.
C. E. Burrows, Walla Walla Gas and Electric Co., Walla Walla, Wash.
J. L. Hallett, Portland Gas Company, Portland, Ore.
John Mather, Seattle Gas Light Company, Seattle, Wash.
G. O. Moen, Astoria Gas Light Company, Astoria, Ore.
Charles F. Adams, Portland Gas Company, Portland, Ore.
John L. Stewart, Philadelphia, Pa.
Ph. Meyer, San Francisco.
John A. Britton, Oakland Gas Light and Heat Company, Oakland, Cal.
M. M. Barrett, San Francisco Gas Light Company, San Francisco.
Van L. Eastland, Oakland Gas, Light and Heat Company, Oakland, Cal.
Edward C. Jones, San Francisco Gas Light Company, San Francisco.
George Thompson, San Francisco Gas Light Company, San Francisco.

W. F. Boardman, San Francisco.
George D. Roper, Rockford, Ills.
Jos. G. Eastland, Oakland Gas, Light and Heat Company, San Francisco.
Oscar B. Weber, New York City.
E. C. Brown, New York City.
Wm. N. Milsted, President American Meter Company, New York City.
S. B. Cushing, San Rafael Gas and Electric Light Co., San Rafael, Cal.
Prof. T. S. C. Lowe, Pasadena, Cal.
J. B. T. Tuthill, Santa Cruz, Cal.
C. B. Hurley, Tacoma Gas and Electric Light Company, Tacoma, Wash.

ELECTION OF OFFICERS FOR THE ENSUING YEAR.

Mr. Eichbaum, of San Francisco, placed in nomination Mr. J. B. Crockett, of San Francisco, for President, which motion was carried unanimously. The same gentleman placed in nomination for the office of Vice- President, Mr. J. L. Hallett, of Portland, and on motion he was unanimously elected.

Mr. John A. Britton, of Oakland, was on motion unanimously elected Secretary and Treasurer.

The following named gentlemen were then placed in nomination as a Board of Directors, and, on motion, unanimously elected: Messrs. John S. Kaneen, of San Rafael, F. H. Eichbaum, of San Francisco, John Mather, of Seattle, and John Kempf, Jr., of Salt Lake.

READING THE COMMUNICATIONS.

A communication was read from the AMERICAN GAS LIGHT JOURNAL, asking that the Association employ a stenographer to have the meeting reported for them. The sentiment of the Association seemed to be against recognizing one journal over another, and the matter was passed.

On behalf of the San Francisco Gas Light Company, President Crockett extended an invitation to the members to a banquet to be held in the evening at the Maison Riche.

The President then stated the programme for the entertainment of the members for the following day.

A recess was then taken in order to enable the members to sign the roll, after which the Association adjourned until 1:30 P.M.

AFTERNOON SESSION.

The Association was called to order at 1:30 P.M. by President Crockett.

READING OF PAPERS.

A paper entitled "The Benefits to be Derived from the Formation of a Gas Association on the Pacific Coast," by President J. B. Crockett, was here read, and by a unanimous vote the President was thanked for the same.

A paper entitled "Is the Electric Light Friend or Foe to the Interests of Gas Lighting," by J. L. Hallett, of Portland, Ore., was here read by that gentleman.

[For the papers by Messrs. Crockett and Hallett see AMERICAN GAS LIGHT JOURNAL, pp. 146 and 147 respectively, issue July 31.]

The following discussion on the paper by Mr. Hallett was had:

Mr. Crockett—This is a very interesting subject, and I hope to hear some discussion on the same. The San Francisco Gas Light Company has had some experience with the electric light. We found that in a great many places where the electric lights had been placed about the same amount of gas was consumed. In a place like the Pacific Union Club, of San Francisco, where their gas bill for November had been $550 for the entire building, including all the floors, containing the dining rooms, billiard and card rooms, etc., as well as the floors of bedrooms, they installed the incandescent light on the lower floor. The bill for lighting for the month of November, 1892, was $35 more per month for that floor than it had been for lighting the whole building with gas the year before. In addition to $584, which they paid for the electric light, we found they had burned $387 worth of gas for the floors above. In order to ascertain the amount of business that we lost on account of the installation of the electric light plant in San Francisco, I caused an accurate count to be made of the number of burners displaced by electric lights, and we found that the total loss to us for the installation of the electric plant had only amounted to a little less than $11,000, which for that number of lights was simply nothing. So we found it in many other cases. Where they placed arc lights in stores the gas bill was about the same. In many places we found it was more, and some places less. As to street lighting, the Electric Light Company has given up that, because they found that the tower system is not suitable to cities, and they do not give sufficient light. They can only place short posts on the corners. They can only do it in the outskirts of the city, where they put up tower masts and light in that way.

Mr. Pearson (of Sacramento)—The Capital Gas Company, of Sacramento, had some experience last winter in lighting the State Capitol building. I might remark that the Capital Gas Company is in the electric light business as well as the gas business. Previous to the last session of the Legislature the Capitol was lit by gas. As an economical move the Secretary of State, authorized by the Legislature, determined to put in electric lights, which he claimed he could do very much cheaper. The Gas Company finally made a contract to furnish the current to the State Capitol, they to pay for the installation. The State was not in position at the time to buy its own machine, and we did not want to buy it. Prior to the last session of the Legisiature the cost per month of lighting the building has been between $1,100 and $1,200. Last session the bills averaged $1,700 per month, or between $500 and $600 in excess of the cost of lighting it by gas. The excessive cost was not because a greater charge was made for electricity than gas, because a lower rate was made than is usually charged for lighting by gas. It was simply owing to the larger consumption of light. The incandescent light does not diffuse as great a light about the room as gas. The light upon the floor is in excess of that of gas per light, but the general illumination of the room is less. The people notice that, and insist on having more light. In the Capitol the incandescent lamps were entirely under their own control, and the result was that they were turned off and on.

Mr. E. C. Jones (San Francisco)—There seems to be a growing demand for the electric light, particularly in large cities. What I have to say applies more particularly to large cities. I was travelling through the country with a German chemist in the year 1885, and I noticed that every time he went to lunch he would take a small piece of beef and cover it with a great deal of mustard. I inquired of him how it was, and he said: "After you have eaten mustard as long as I have, and your sensitory nerves have become used to it, you will probably be able to use as much of it as I do." I think it is the same way with the electric light. The time was when a common rush light supplied all the demands of the people, while now a light cannot be too brilliant. I have here a few figures, and although they are four years old they are quite interesting. They relate to the lighting of the city of Paris, which is probably the best lighted city on earth, because it is the most cosmopolitan. The figures begin with the year 1855, and give the number of candle hours of light per inhabitant. In 1855 Paris was illuminated by candles, vegetable oils and gas. There were 220 candle hours per inhabitant of candles used, with 1,174 candle hours for vegetable oils, and 2,371 candle hours for gas, making a total illumination of the city per inhabitant of 3,765 candle hours. It then jumps to the year 1872—candle hours per inhabitant, 250 candles, 967 vegetable oils, and mineral oils (which came in but a short time previous), 503; gas, 4,272, or nearly double. The total lighting or candle hour was 5,992. You will notice how slight the diminution in candles per inhabitant, for, in 1877, although it is 22 years later, it is candles, 210; vegetable oils, 770; mineral oils, 722; gas, 4,776. Electricity comes into the field in 1877, with 65 candle hours per inhabitant, making the total light required for the city, 6,543. In 1883 it was candles, 217; vegetable oils, 649; mineral oils, 1,224; gas, 6,087; electricity, 230; total, 8,427. We come down now to 1889, when it is candles 190 hours per inhabitant for ordinary candles for lighting the city of Paris; vegetable oils, 517 (this small consumption being on account of expense and scarcity); mineral oils, 1,995; gas, 6,470; electricity, 2,130; total, 11,302. During 34 years the light required per inhabitant in Paris increased from 3,765 candle hours per inhabitant, to 11,302 candle hours per inhabitant. It is almost in a direct ratio. I therefore think we have nothing to fear from the electric light or any other means of illumination, unless some light comes into the field which costs almost nothing.

Mr. Crockett—I think one very important matter with regard to the question of electric lights in competition with gas was not touched upon, and that is the use of gas for running engines. The San Francisco Gas Light Company has been supplying the city and county hospital here for a long time with gas for illuminating purposes. In the last year they concluded they would light the hospital by separate plant of their own, and the city purchased dynamos and an electric plant and installed it in the hospital. But when they came to the question of power they concluded that gas was the cheapest, and they placed a gas engine, the bill for which engine was about what we used to charge them for supplying gas.

Mr. Parker (of Napa)—We have had a little experience with electric lights up our way. A party came there and started an electric light company and the people took hold of it so quickly that it made us feel quite nervous. They succeeded in taking away about three-quarters of our main street. They procured a contract from the city for street

lighting also. We kept on the even tenor of our way, endeavoring to show our customers the advantage of gas consumption in both cooking and lighting. We enlightened them on gas engines, three of which were introduced in the town. We kept up our regular price for gas lighting at $5. In a year or two the electric light company came to us saying they had demonstrated that they were a success, and said they would sell out for about $40,000. We declined, and they then said that they would enter the field for house lighting and they put an advertisement in the paper which did not seem to take very well. About three months later they came and offered to consolidate, and we told them no, that while we might sell the gas works, we did not choose to buy. They next came and asked what we would pay for old junk, and I said we were not buying old junk. Finally they came and said, "pay us for the wire and poles," but we still refused. The electric light company closed up business. Shortly after that Mr. Taylor came to see me and he said: "You will ultimately have to purchase the system, and you had better let us install it on your property." I said "No. Go right along; we will attend to our business and you can attend to yours." He said, "You don't know what you are talking about." I said "Maybe." He said, "I am operating with a cold blooded speculator." They started ahead, and Mr. Taylor was as active in getting into the field as was Mr. Hensell before him. They have gone on, but our consumption has increased, and our gas engines are looked on with favor. I cannot say that the electric light has injured us, and we are now using five retorts where we before used three or four.

Mr. Steinman (of Sacramento)—The Napa Gas Company fared much better than the Sacramento Gas Company. In the last six years we have bought out three electric light companies. First we had the Brush Company. They were getting some of our customers away and we thought it best to buy them out, and we paid them about $18,000. Then came along the Thomson-Houston Company, which we finally bought out. Then another company obtained a franchise, which they called the Central Electric Company. The Capital City Gas Company was getting $21 for a moonlight schedule, and when our contract was up they went before the Board of Trustees and put in a bid for $14.95. They had nothing but promises there, and the Board of Trustees awarded them the contract. Twenty-six minutes from the time they got their contract they were around offering to sell it to me, and 24 hours afterwards we had the contract, and the Capital City Gas Company has been supplying them ever since. We were finally told that we could not generate electricity at our station, and we would have to have it up town, but we finally got it all under one roof, and we are now lighting the city. Our Directors say we have all kinds of lights—gas lights, electric lights and Israelites.

Mr. Britton (of Oakland)—We have had some experience in Oakland in the last few years in a combination of gas and electricity, and I think we were possibly the pioneer Company of the State to adopt electricity. I think the much-talked of Mr. Taylor was also with us. That was something like nine years ago. We built a small station, with three dynamos, and we have since then increased it. We bought out no companies, and we are fighting opposition electric light companies. We are supplying possibly 3,000 or 4,000 incandescent lights and arcs. We are selling more gas than before, as each month shows an increased consumption. We have introduced the electric light into the houses, and we have done a good deal in selling gas stoves and heaters. We have sold something like 1,500 gas stoves and heaters, and have 50 or 60 gas engines scattered all over the city. For power purposes we have reduced our regular rates 20 per cent. We are now selling gas for engines at $2 per 1,000; heating and cooking at $2.25. We have fostered the using of gas for every purpose. We canvas people personally that we think are likely to take kindly to the use of gas, and we also send out circulars. We used to rent gas stoves, but found it a losing proposition, and about two years ago we commenced selling them directly. We set separate meters, and sell the stoves for the price which we get them for from the East, with the freight added. Three years ago the proportion of our heating output was only 2 per cent., but for the fiscal year ending June 30th it will be about 16 per cent. Our experience in that regard and as to electric lighting has been satisfactory. On our principal thoroughfares, such as Broadway and Washington streets, they have cut down the consumption very largely. We sell no more gas on Broadway street now than we did eight years ago. Our town is growing and spreading out, and we cover a larger district than even San Francisco, as we supply both the towns of Alameda and Berkeley. At one time the opposition electric company put in as many as 50 or 60 motors, and they ran them at a loss of $500 or $600. We opposed those with gas engines, which has led to their use quite generally. One planing mill in Oakland uses a 25 horse power gas engine, and employs the exhaust of the engine for drying. The owners say it is cheaper than either coal or wood. The Coast coals are sold at retail for about $7, and the Australian coal at about $8.

Mr. Burrows (of Walla Walla)—In another small city where an electric light company was started, the Gas Company was nearly ruined, and while the Gas Company is not declaring any dividends, the electric light companies are also suffering, and they cannot profit by the process now prevailing. They will have to generate their power with steam. We went into the protective business quite extensively. Mr. Keith, of San Francisco, put in an electric plant, which was readily adopted, but it did not go far before they took them out. Of course we organized, and I found that they were going ahead, and we started the electric light and made it pay.

Mr. Quilty (of San Jose)—I represent San Jose, the would-be Capitol, which I think has been the battle ground of more light fights than any other town in the State, both gas and electric. We have an electric opposition there now which has been in full tilt for four years, and we are selling incandescent lights. They are both well managed, both well backed financially, and we have pushed the business to the utmost. San Jose consequently represents a fair test of what gas will do in the face of a bitter electric light opposition. We are selling electric lights for 15 cents a week on the 10 o'clock circuit, and 20 cents a week on the 12 o'clock circuit, and furnish renewals. We are selling arc lights for $1.50 per week on the 9 o'clock circuit, and $2 per week on the 12 o'clock circuit. In the face of this strong competition in electric lighting, the San Jose Gas Company sold more gas last year than it ever did before. We developed the gas stove business, placing 150 of them, and are consulted considerably for engines and gas for other purposes. We sell gas for illumination at $3, and $2.50 for cooking. I would like to pay a tribute to Mr. Taylor. An agent went round, and before I knew it he had obtained contracts with 150 consumers. We bought them out, took their machinery, and we have congratulated ourselves that we did it. As our Chairman has well said, small gas works will do well to own a small electric light plant in connection therewith, and they can pump their own water. In San Jose gas at $3 per 1,000 is knocking out electricity at 15 cents a lamp a week.

Mr. Clements (of Red Bluff)—We have a small electric plant, and both branches are doing well. We have been supplying small stoves, and the people are well satisfied and every housekeeper is talking about it. We make a special reduction for stoves. We have but two gas engines, yet we can see that the business will grow in the very near future, notwithstanding we have electric lights as well. Our Company has paid a very good percentage on its investments, and from the books I learn that we are making within a very small percentage of what we were making before the electric light was put in.

Mr. Eichbaum (San Francisco)—I am pleased to hear the very good accounts that we have had. I think it is well for everybody to examine and determine what other countries are doing and have done, because the same causes will produce the same results here that have been obtained in other countries. Never a time did the gas field afford a finer field for investment than it now does in Germany and France. We read of a gas holder of 12 million feet capacity. It is safe to say that 30 years ago there was not in existence a holder of one million feet capacity. There might have been such in England, but not in the United States, at least. The San Francisco Gas Light Company has now built a holder of two million feet capacity, which exceeds about 50 times the idea of the first projectors of gas works. When they first spoke in the House of Commons of building a gas holder of 50,000 feet capacity, it was thought to be a chimerical project. There are now in the United States several gas holders of 2 millions, 3 millions, 3½ millions, and at least one over 4 millions. I consider that the incandescent light people are our enemies. I do not consider the arc light people our enemies, because I feel that they have raised the standard of light to such an extent that they have benefited the gas business more than they have injured it. Since the advent of the arc light in 1877 they have probably doubled the demand for artificial light. I am somewhat reluctant to speak of myself, but I will say that in 1877, when the arc light was first brought here, I was sent for by two gentlemen who were very largely interested in gas lighting stock. I had not been here very long at that time, and these gentlemen knew that I was conversant with what was going on in the East, and they, therefore, asked my opinion as to what would be the result of the advent of the electric light. I told them I thought it would be a great benefit; that the standard of lighting would be so raised that people would burn more gas than they ever had before. Since that time one of those gentlemen has given me credit for having seen further at that time than they did. About three years ago I saw a summary of gas lighting in the English *Journal of Gas*

Lighting, which stated that the standard of gas lighting had been so raised by the arc light that it has been a positive benefit to the gas business. Not long ago there was a gathering of the electric light people held in Massachusetts—I do not know whether it was formal or informal. One of their strong points, which I think will be a great comfort to the gas people, was that inasmuch as the incandescent light was a better light than the gas light, that people must buy more of it, and that it was now in to try to compete with gas, provided gas was sold at a reasonable figure. I think that is one of the most comforting of assurances, coming from the source that it did. As to what has been done here in the way of furnishing gas for cooking and power, Mr. Crockett has gone over the ground so well that I need say nothing about it.

Mr. Phil. Meyer (of San Francisco)—It has been asked whether it would be profitable for gas companies to combine and run gas and electricity together. In my humble opinion, I say it is not. Gas companies ought to stand at a decided point and fight. We now have appliances which will enable us to do that. Take, for instance, the Welsbach burner, which, in many places, is making a clean saving—in one place, with 18 lights, to the extent of $11 a week. I have displaced arc electric lights and replaced them with the Welsbach burners. We placed 22 Welsbach burners, with a candle power of 140, with a consumption of about 2½ feet each. We displaced the arc light, I think, with 18 other lights. The whole consumption came on us for electric lighting and gas lighting of $45 a month. We cut it down to about $25 with the use of the Welsbach burner. One place where we replaced the arc light with the Welsbach burner, the cost of the electric light was about one cent an hour, and it is now about one-half cent for the Welsbach burner, and the man says he has more light. It goes in a ratio of about one cent or a cent and a half against six. It is a saving of five cents per hour on six lights. Even street lighting could be done cheaper with the Welsbach burner. We have at present a burner which will equal 100 to 125 candle power with 4½ to 5 feet of gas. It has been tried, but for certain reasons it was removed. I therefore say, I think if gas companies give their attention to the Welsbach burner, they can very successfully compete with the arc or any other electric light. We have placed some of these burners in Stockton that have been running two years, and still the gas people say that they do not last long enough. As to the incandescent light, sometimes they last three days, sometimes two or three months, but that is the end of it. They are too frail; the moment they are blown out they go to pieces. I could show you many places in the city here where they were placed on the 29th of April, since which time they have not been renewed. The place is lighted just as brightly to-day as it was on the 29th of April. And so in many other places. If the gentlemen here assembled in the interests of gas give to the appliances which we have the necessary care, we could very successfully compete with the electric light, both arc and incandescent. I think the heat arising from the Welsbach burner is less than in any other burner. Authorities in the East say that but one-third of the amount of gas is consumed.

Mr. Jones (of San Francisco)—We will arrange our photometer room so that Mr. Meyer can place some of his burners on and illustrate it to you to-morrow.

Mr. Kempf (of Salt Lake)—In Salt Lake we control both the gas and electric systems. We have both the incandescent and arc lights. On the contract system it was not satisfactory. Afterwards we put on a meter system, which was still unsatisfactory. We have a firm there who introduced the Welsbach burner about two months ago, and up to the present time we have heard no complaint from them, and it has cost them considerably less than both the arc and incandescent lights. I therefore think it would be much better to apply the modern appliances to gas.

Mr. Roper (of Rockford, Ill.)—I had the pleasure of being in Cleveland a while ago, when tests were made of 169 samples of the Welsbach burner, and they showed that 2.6 cubic feet of gas gave 72 candle power.

On motion of Mr. Eichbaum, of San Francisco, the Association, by a unanimous vote, tendered its thanks to Mr. Hallett for his very able and interesting paper.

THE QUESTION BOX.

The President here stated that there were many questions in the box, and the time had come to take them up.

Question No. 1.—What is the name of the new Japan coal, and what is its value in gas and coke?

Mr. Eichbaum (of San Francisco)—We have used a great deal of the Japan coal. We use both kinds of gas and used both together, and we have consequently no means of knowing the separate uses of the two kinds of coal. When we first got the coal we had been running along with a fair result for several months, and in order to know what the coal was doing we charged with nothing else for one day, and our candle power went up two-thirds. The coal is very cheap, but I have heard of no sales here lately, and could not state what it is at present. You must not be afraid of this coal when you first see it. It looks like a pile of slack. It is a most deceiving coal. There is not 12 per cent. of lump in it. It has, however, wonderful powers for melting. It melts perfectly, and upon putting a piece in the fire it will open just like a flower unfolding, and then by spreading it leaves nothing solid in it whatever. It does not give near as much gas as it is claimed it will, however. You can largely discount the statements in their literature. The coke is very light and seemed to be of very little value. For that reason we have never used it since.

Mr. Crockett (of San Francisco)—We had some of this Japanese coal. We took 100 tons of it and made experiments that were very complete and satisfactory. I had a test made of the coal first by Mr. Fenner, and his report was so high that I was certain he had made some mistake. I did not think it possible to get such results out of that coal. I asked Mr. Jones to make a test of it and see if he could not find some error in Mr. Fenner's test. The two tests, however, came out close together, making the allowance that should be made for any other coal.

Mr. Fenner—I tested 400 pounds of Miike coal, and I found the yield per pound to be 5.88, or per ton, 13,178, which gave it a total of 36,243 candle feet and an average of 15.40 candles. The coke was 240 pounds and measured 8 bushels.

Mr. Jones—I had in my pocket the tests of two kinds of Japan coal. The test which Mr. Fenner has given you is the test which we took together at the Potrero station. (Gives results.) Two hundred pounds of the coal simply covered the bottom of the retort, and the men complained that they could hardly place their rakes in, on account of its swelling so much. We ran the works at the Potrero one day, in which we made these experiments, entirely on this coal. We used in the neighborhood of 100 tons of coal. When placed in the retort the coal will flash, and there is an immense amount of fine carbon particles. They choke up the mouthpiece. We found also that it was a sulphurous coal. We should have changed the purifiers the following morning, and on that day we were obliged to change them at about 4 o'clock. It made a difference of 40 per cent. in the purification. We afterwards tested 400 pounds of Yubarri coal from Japan, and this coal yielded 5.67 feet per pound; 12,700 cubic feet per ton. The average candle power was 18. That is 2.6 average more candles than the other coal. The coke weighed hot was 225 pounds, which is 56.25 per cent. of the original weight of the coal. It yielded six bushels of coke, and it is a little harder coke, and is more dense. I believe that this Japan coal would be an excellent coal to mix with some other; say in the ratio of 50 per cent.

Mr. Hallett (of Portland)—I made a test of this Japanese coal, and my experience was similar to the result obtained by Mr. Jones. I have not the figures with me, but I remember the yield was enormous—considerably over five feet, and a very high candle power of, I think, 18½. So far I was very much pleased. When the charges were drawn we had the same difficulty in getting the coke out. We could not get the rake into the coke. The retorts were crowded with coal. This could however be obviated by putting in less coal. I found the standpipes stopped, and it not only affected the standpipes, but the hydraulic main, to such an extent that it was nearly a week before we got rid of the stoppage. It seemed to thicken up like tar. It did not run off freely. I found that immediately after the use of that coal we had to change our purifiers. In that respect our experience is again the same as Mr. Jones'. I afterwards concluded that while it was a good coal for yielding gas and producing illuminating power, that the other difficulties were such that I did not care to experiment further with it. I do not wish to condemn the coal, as it may be very well mixed with other coal.

Mr. Eichbaum (of San Francisco)—We have used it preferably with Walsend.

[To be concluded.]

Cement for Steam Pipes.

A cement of specially valuable properties for steam pipes, in filling up small leaks, such as a blow hole in a casting, without the necessity of removing the injured piece, has been compounded. The cement in question is composed of 5 pound of Paris white, 5 pounds yellow ochre, 10 pounds litharge, 5 pounds red lead, and 4 pounds black oxide manganese, these various materials being mixed with great thoroughness, a small quantity of asbestos and boiled oil being afterwards added. The composition, as thus prepared, will set hard in from two to five hours, and possesses the advantage of not being subject to expansion and contraction to such an extent as to cause leakage afterward, and its efficiency in places difficult of access is of special importance.

Hearne's Center Seal.

On July 11th U. S. Letters Patent (No. 501,342) were granted to Mr. John Hearne, of Boston (one-half the patent is assigned to Mr. Wm. J. Strong, of New York), for a new and improved center seal. Using the words of the specification:

My invention relates to improvements in that class of valves known as center seals, which are used in connection with a plurality of gas purifiers, to direct the gas into and out of said purifiers, and the object of my invention is to produce a simple and easily operated seal, which may be made of a capacity to connect with any necessary number of purifiers, which is provided with a gas inlet and outlet arranged in such a manner that the gas may flow unobstructedly through the seal, and which has a plurality of supplemental and easily operated valves by which the gas may be directed to any desired number of purifiers, or may be cut off from one or all of the purifiers without interfering with its flow through the seal, and this arrangement is especially advantageous, as it enables the operation of purifying to be carried on through certain of the purifiers, even though the others should be out of repair or unfit for use.

Fig. 1

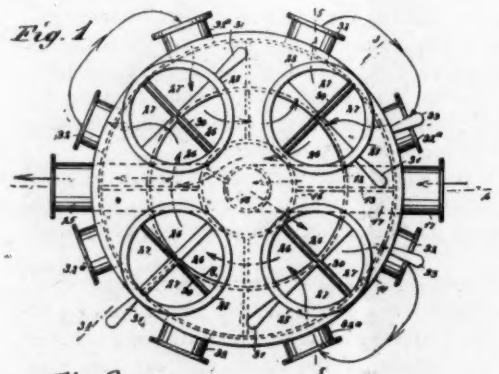


Fig. 2

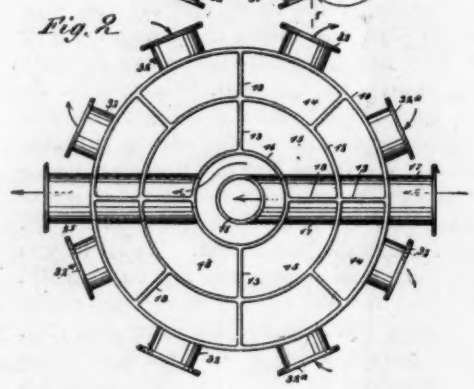


Fig. 3

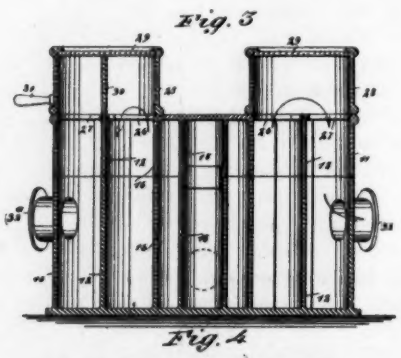


Fig. 4

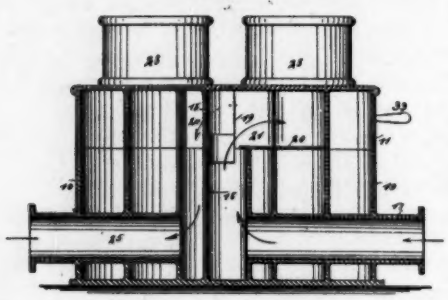


Fig. 5

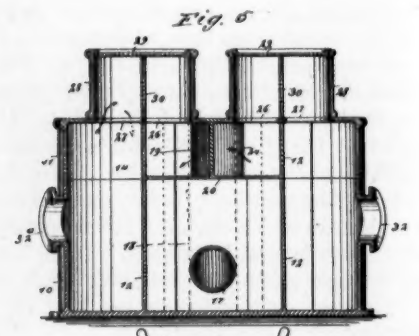
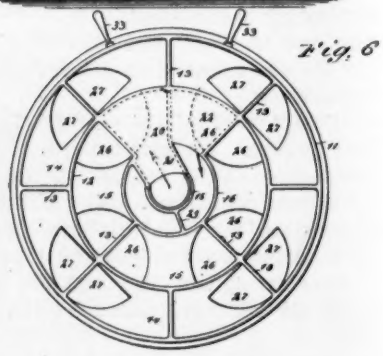


Fig. 6



To these ends my invention consists in certain features of construction and combinations of parts, which will be hereinafter described and pointed out in the claims. Reference is to be had to the accompanying drawings forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Fig. 1 is a plan view of the center seal embodying my invention. Fig. 2 is a plan view, with the top portion removed. Fig. 3 is a vertical cross section on the line 3—3 in Fig. 1. Fig. 4 is a vertical section on the line 4—4 in Fig. 1. Fig. 5 is a vertical section on the line 5—5 in Fig. 1; and Fig. 6 is an inverted plan view of the top or cover of the seal.

The seal is provided with a suitable shell 10, which has a top or cover portion 11, the interior construction of which is substantially like that of the bottom portion of the seal, but this top portion may be turned on the lower portion so as to bring the purifier ports into a desired position in relation to the gas inlet and outlet, as hereinafter described. The shell 10 is provided with a vertical annular partition 12, and with a plurality of radial partitions 13, thus dividing the shell into two series of chambers 14 and 15, the series being placed concentric, and the chambers are entirely separated from each other by the partitions named.

In the center of the seal is a vertical partition or tube 16, which serves as an outlet tube, and the main gas inlet pipe 17 extends inward through one side of the shell and terminates in a vertical inlet pipe or tube 18, which extends up centrally through the outlet tube 16, as shown clearly in Figs. 2 and 3.

The top 11 has the partitions 12 and 13, which are placed exactly as in the lower portion of the shell, and when the partitions above and below register, the chambers 14 and 15 are continuous from the top to the bottom of the seal.

The tube 18, at its upper end, that is, that portion of the tube which is carried by the top or cover 11, is cut away on one side, as shown at 19, to provide for the passage of gas, this arrangement being best shown in Fig. 4, and two adjacent chambers 15 of the upper portion of the shell are provided with a transverse partition 20 at this point, and the partition 20, as well as the two side partitions, is extended inward, as shown at 21 in Fig. 6, to connect with the side opening in the pipe 18, so that the gas which flows in through the said pipe will pass into the upper part of one of the chambers 15, and to provide for the outlet, the plate or partition 20 is extended across the second chamber 15, and this chamber is placed in communication with the outlet tube 16, as shown clearly in Fig. 6. The tube 18 is braced opposite the cut-away portion by a rib 23, extending from the wall of said tube to the wall of the tube 16. The chamber 15, connecting with the outlet tube 16, through the passage 24, see Fig. 5, is the last chamber through which the gas passes after going through the purifiers, and from this point it passes downward through the tube 16 and out through the outlet tube or pipe 25.

In the top of the seal, near the intersection of the partitions 13 and 12, are holes or ports 26 and 27, which are arranged in pairs, the ports 26 communicating with two adjacent chambers 15, and the ports 27 with two adjacent chambers 14. Pivoted on the top of the case above these ports are revoluble supplemental valves 28, which have closed tops 29, and each valve is provided with a vertical transverse partition 30, which is adapted to register with a partition 13, or to lie against the top of the case at right angles to said partition, thus separating the chambers 15 completely from the chambers 14. It will be seen that when the partition 30 registers with the partition 13 the gas may flow from one chamber 15 through the valve and into the opposite chamber 14, but when the partition 30 is at right angles to the partition 13, the gas will flow upward from one chamber 15 through the valve 28, and back into the next chamber 15. The valves 28 are each provided with a handle 31, by which they may be turned, and their position may be determined by the handle and a suitable mark on the seal top.

The chambers 14 are in connection with gas purifiers (not shown), and as illustrated the seal is adapted to connect with four purifiers, although it may be made of any capacity. The gas under the arrangement shown will therefore flow out from one of the chambers 14 through an outlet pipe or port 32, and back to the next chamber through a port or pipe 32a, thence through one of the valves 28, and so through the next purifier, as will be described presently.

The top 11 may be turned by means of any suitable mechanism, and as the seal is usually a somewhat massive affair, gearing is generally employed to turn the top. The top is provided with indicators or pointers 33, which project outward and which are spaced so that one will be

above a pipe or port 32 when the other is above the next pipe or port 32a. One of these indicators is directly opposite the inlet opening or port 17 in the pipe 18, and consequently the position of these indicators or pointers will show the point at which the gas enters the seal, and the first purifier to which the gas naturally flows. If the gas is to be sent to all the purifiers, the several valves 28 are set with their partitions 30 parallel with the partitions 13, and the top 11 is adjusted so that the upper and lower portions of the partitions 12 and 13 register so that the chambers 14 and 15 are continuous from top to bottom. The gas then will flow inward through the pipes 17 and 18, pass through the opening or port 19, through the port or passage 21 to the upper part of one of the chambers 15, thence up through a port 26 above the seal top, thence through the adjacent port 27 to the outer chamber 14, thence out through one of the ports or pipes 32, through the purifier connected with the said pipe, thence back through the next pipe 32a, to another chamber 14, thence up through the opposite side of the valve 28, thence back through a port 26 to the next chamber 15, thence through the next valve 28 and the next pair of pipes 32 and 32a and the purifier connected therewith, and so on around the entire seal and the whole series of purifiers until the gas which passes the last valve 28 enters the upper portion of the last chamber 15 above the partition 22, and from here the gas passes out through the port 24, the outlet tube 16 and the outlet pipe 25.

The gas may be shut off from any purifier by simply turning one of the valves 28 above the pipes connected with said purifier, so that the partition 30 is at right angles to the partition 13 beneath, which is illustrated at *A*, in Fig 1. When this is done the gas which passes upward into the valve from the chamber 15 beneath, cannot pass the partition 30 to one of the holes 27, but passes through one side of the valve and into the next hole or port 26 to the adjacent chamber 15, and so on to the next set of purifiers, and it will be readily seen that in this way the valves 28 may be adjusted if desired so as to shut off all the purifiers and permit a free flow of gas through the seal, or any particular one or more can be shut off if desired.

Something More about the New River Coal Fields.

[Written by Mr. E. C. Pechin for *American Manufacturer*.]

Accustomed for many years to see only that part of West Virginia lying on either side of its railroads, generally steep and rugged hillsides, it was frequently a matter of wonderment as to where, outside of the towns, the people lived who at election times at least showed unquestionably that there was a considerable number of inhabitants, even if the ordinary tourist did not see them. A recent visit to Fayette county caused several large scales to fall from the writer's eyes. As one rushes through the canyon and picturesque defile of New River, his vision is bounded by lofty hills rising precipitately from the water's edge. At the base at intervals a side track has been made, a coke oven site scooped out, an occasional store building, a house, then shanties and shacks literally hanging from and sometimes sliding down the hillsides, and high up near the top coal openings with their connecting inclines. The rugged mountain sides are broken at times by deep ravines and wild gorges which, while they in a measure relieve the sameness of the scene, offer to the eye nothing but somber trees, gray rocks and rugged steeps.

There are no bridges over the New River for ordinary travel. The only communication between the two banks is by means of wire rope ferries, and after heavy rains which turn the usually quiet river into a rushing, roaring torrent, even this is interrupted.

Near the station of Thurmond (Chesapeake and Ohio Railway) there are two of these ferries, one above the bridge giving access by Dun Loup Creek to the country beyond, and the other just below, leading to a road that, running through the wild, rugged and romantic gorge of Arbuckle Creek, leads, after weary ascents, to the snug village of Oak Hill and the farming country beyond.

The ride through Arbuckle Creek gorge on a pleasant spring morning is simply ideal. The crystal mountain stream dashing in silver spray over the rocks, oftentimes in sheer falls of hundreds of feet, overhung with the luxuriant foliage of the rhododendron wherever it can obtain a precarious foothold. A steep, narrow, rocky road, winding along and crossing and recrossing the stream, with masses of gray rocks rising perpendicularly at times a hundred feet, covered with mosses and clumps of ferns and clinging vines, and over all a dense canopy of waving tree tops, with all of the exquisite tints of spring commingled with the somber winter green of the pines, and everywhere the shoots of vivid sunlight, on water, rock and leaf, making a veritable elfin bower.

Crossing the upper ferry, and striking Dun Loup Creek, the road winds and twists around the mountain side, doubling on itself, gradually gaining height by long ascending reaches, until a vertical height of 1,200 to 1,500 feet is attained. On the one hand, deep down the steep mountain side are the turbid waters of the New River, and on the other hand, stretching out for miles and miles, a cleared and cultivated farming country. To the stranger, this comes with the suddenness of a positive surprise.

As far as appearances go, the farming in this section is above the southern average in the cleanliness of fence corners, the condition of the fences and crops, and the character of the buildings, both dwelling and farm. The bright tobacco raised here took the first prize at the Richmond Exposition. I was told that the fruit crops were regular and excellent, and could readily see that with careful and intelligent cultivation, this whole upland region was capable of being made a veritable garden. At this visit I was not able to get over to Raleigh Court House, but friends tell me that before this is reached, the undulations largely disappear, and that the great Raleigh Plateau, while on a mountain top, is as flat as a Kansas prairie for miles.

Dun Loup Creek is the dividing line between a long stretch of wild mountain land on the east and miles of farming lands on the south and west.

The location of my resting place for two days, the house of Mr. W. N. Jenkins, was superb. Immediately surrounded by wheat pasture and tobacco fields, a short distance in front of it the ground pitched sharply away to the picturesque defile of Dun Loup Creek. From one end of the front porch the eye could wander over miles of farms, alternating patches of green fields and wood, buildings peeping out of shrubbery, and grazing stock standing out with sharp outlines against the evening sky. On the east and north the same eye could roam at will, over huge stretches of somber unbroken forests, foot hills, ravines, higher hills, gorges, masses of gray rock, until brought up by a vast horizon line of lofty mountains, many long miles away. The tortuous course of New River threading its way through these same mountains, was clearly marked by a thin line of smoke from the locomotives, hanging as if suspended from the mountain side.

Now just here it may be pertinently asked, what has all this rural beauty to do with the ordinary topics of a mining and manufacturing journal?

It has a great deal to do with it. Every mile of this beautiful country is underlaid with steam and coking coals of the highest grade and capable of being wrought and marketed under the most favorable circumstances.

It is a risky thing for a professional man to make a prediction as to the future of a mineral district. In this instance, however, I venture to assume the responsibility of saying that in my judgment, with fair business handling, there is no district in the great Appalachian coal field that promises a more brilliant and enduring future than the one under consideration and now being opened up by the Chesapeake and Ohio Railway.

The reasons for this conclusion will be given as succinctly as possible, so that each may judge for himself.

From Thurmond, at the mouth of Dun Loup Creek to the navigable waters of the Kanawha, at Charleston, 58 miles, to the Ohio river at Huntingdon, 108, to Cincinnati, 269, to the Great Lakes at Toledo, 369, to the mouth of Chesapeake Bay at Newport News, 386 miles.

It is within striking reach of great markets already taking an enormous quantity of coal and steadily demanding more, and with the progress of scientific research and intelligent use, becoming more and more critical concerning quality.

Along the first 10 miles of road now building up Dun Loup Creek, the outcrops of three seams of coal have been found and exposed. At the river all are above water level, but as the dip of the coal is south and west outside of Camp Meadow Fork, Cedar and Hamilton branches of the Lower Dun Loup, the lower or No. 3 seam is under water level. No. 2 also disappears further up.

The upper or Nutall seam, which on New River is near the top of the high hills, steadily dips southwardly, and this combined with the gradual rise of Dun Loup, brings the coal nearer to the level of the stream. The general direction of the creek from its mouth to its source is southwestwardly, with many windings and turnings cutting through this coal stratum. In the first 12 miles many openings have been made, never less than 4 feet thick on the extreme east, to 5 feet 6 inches, 5 feet 10 inches and 6 feet as the Raleigh Plateau is approached.

The coal lies under water level under much of the great agricultural region above described, but can be readily attacked when the necessity arises. The horizon of this Nutall seam is well established, but considerable confusion still exists concerning the relative positions and char-

acter of the Fire Creek and Quinnimont which remains to be cleared away. Whether these are two distinct seams in the upper country, or come together, or whether one thins out and the other thickens up into the Great Flat Top seam at Pocohontas is yet to be determined. Discarding these two seams altogether, the Nutall seam, clearly located and defined as underlying tens of thousands of acres, will alone furnish all the coal that the present and succeeding generation will demand.

For convenience of reference the following well known analyses have been collected. These tell the whole story.

Nutall Seam.

Water.....	2.41	1.35	.34	.52	1.03
Fixed carbon.....	71.82	70.67	69.	75.80	72 32
Volatile matter...	24.43	25.35	29.59	21.83	21.38
Sulphur.....	.371	.54	.78	.37	27
Ash.....	1.34	2.10	1.97	1.85	5.27
Chemist.....	Eggleston.	Dwight.	Froehling.	Dwight.	

Fire Creek Seam.

Water.....	.61	.735	.40
Fixed carbon.....	75.02	75.499	72.25
Volatile matter.....	22.34	22.425	22.40
Sulphur.....	.56	.536	.508
Ash.....	1.47	.805	4.95
Chemist.....	Rickets.	McCreath.	Froehling.

Quinnimont Seam,

	Lump.	Slack.			
Water.....	.76	.83	.668	.97	.94
Fixed carbon....	79.29	79.40	70.657	74.75	75.80
Volatile matter..	18.65	17.57	26.642	21.48	18.19
Sulphur.....	.23	.28	.498	.316	.30
Ash.....	1.11	1.92	1.535	3.10	4.68
Chemist.....	Eggleston.	do.	McCreath.	Froehling.	Britton.

It necessarily follows that if the above coals will coke, the resultant product will be high grade, as far as chemical composition is concerned.

	Carbon.	Ash.	Sulphur.	Chemi t.
Nutall coke.....	94.03	3.90	.494	Britton.
" "	94.62	4.91	.549	"
" "	93.	6.73	.27	Dwight.
" "	92.22	7.53	.92	"
" "	91.96	5.02	.45	Heager and Wickham.
Fire Creek.....	92.18	6.68	.61	Ricketts.
" "	91.44	6.62	.538	McCreath.
Quinnimont.....	93.85	5.82	.30	Britton.
"	93.11	5.94	.82	Eggleston.
"	92.73	5.15	.581	Heager and Wickham.

A discrepancy will be noticed between the ash shown in the coal and the resultant coke, but this probably arose from some selection of the coal samples, while the coke represents the run of mine.

It can be unhesitatingly assumed that either of the three coals on New River, when fairly treated, will uniformly give a coke with fixed carbon over 92 per cent., ash under 7 per cent. and sulphur under 0.8.

The coke is hard, strong and silvery. It stands carriage so well that is now being shipped to Mexico for smelting purposes.

As per statement of the manager of Pullman Car Works (see *Iron Trade Review*, May 1, 1886) it melted 16 pounds of iron with 1 pound of fuel. "It melts faster and hotter than Connellsville, and costs less per ton, and takes less per charge of iron." As a blast furnace fuel, its excellency and efficiency are unchallenged.

The geographical position and quantity and quality of the coal being satisfactory, the following statement is hazarded—that there is no coal field in the country that can be wrought under more general and specific favorable conditions.

1st. As to the operator. For many miles along Dun Loup Creek the coal so lies that it can be attacked at just the proper height for economic handling, tippling and storing without either inclines or elevators, and self-draining and with ample room below for side tracks, coke ovens, stores, stables and dwellings.

Whatever the thickness the coal may be, from 4 feet to 6 feet, there are no slate partings, but it is clean and merchantable from top to bottom.

Sandstone of the best quality abounds; plenty of water and timber both for building and mining purposes.

The regularity and persistency of the seam is so well established that positive calculations can be made in advance of how much coal is to be won on each lease, and hence improvements can be made with certainty.

2nd. As to the workmen. The climate is superb, bracing, invigorating and health giving. The altitude of the county is between 1,500 and 2,000 feet. The whole region is abundantly supplied with the purest of free stone water, and the vast extent of fertile farming lands above described, can and will supply at low cost the large majority of the food supplies needed by a numerous working and consuming population, giving a close home cash market to the farmers, and low first cost to the workmen, avoiding handling, freighting and intermediate profits. The certainty and permanency of mining operations will justify the erection of good dwellings for the operatives, and the gradual development of the field will bring schools and churches.

These facilities joined with the natural advantages of the locality will unquestionably attract good men with families, because both instinct and the tendency of the age combine to attract working men and women to where they and their children can be well fed, well housed and well taught.

If the early operators are shrewd they will seek at the outset by selfish, and at the same time wise liberality to impress upon this new center a condition of reasonable excellence and comfort. As I have said elsewhere, good living conditions mean good workmen, and good workmen good work, and good work means in the long run good profits.

As against many advantages there is undoubtedly one drawback, viz., that the locality is dependent upon one railroad, and that the entrance of another and a competing line is a very remote possibility. Ten years ago this might have been a serious objection, but the course of events and a larger knowledge have very materially changed the views and policy of railway managers.

It is now generally recognized that "it is not wise to kill the goose that lays the golden egg." While there may be no competing road, there are many competing districts, and it is safe to say that the present management of the Chesapeake and Ohio Railway is too shrewd not to encourage in every possible way the development of a business that both directly and indirectly means prosperity to itself.

While the district might be handicapped, it is not at all probable that it will be.

[From the *Colliery Engineer.*]

Report of the Pennsylvania Commission Appointed to Investigate the Subject of Anthracite Coal Waste.

The commission was appointed "to investigate the waste of coal mining, with a view to the utilizing of said waste," under an Act of Legislature, which was approved on the 7th day of May, 1889.

Of the three commissioners originally appointed two have been removed by death, namely, Peter W. Sheafer and Col. John A. Price. The commissioners who have completed and issued the report are Messrs. Eckley B. Coxe, Heber S. Thompson and William Griffith.

The commission, after being fairly organized, considered:

(1) That the most important work to be done was to determine the causes of *waste* in its broadest sense, and briefly suggest how it should be diminished.

(2) That while it is important that attention should be called to the methods, apparatuses and furnaces that were in operation for utilizing the smaller sizes of anthracite, yet it would be out of place to give a comparison of rival systems.

(3) That while the body of the report should be as untechnical as possible, it should give the general results briefly but comprehensively.

(4) That a series of appendices should be given, containing technical details for the information of those who wish to make a closer study of any part of the subject.

The Cause of Waste.—In going into the question of the causes of waste they point out that the thicker the bed of coal, the less is the percentage that can be obtained in mining, and a vein of coal 8 feet thick will yield a much larger percentage of coal than a vein 20 feet thick, and the nearer the vein is to being horizontal, the greater will be the yield of coal.

Again, the amount of coal that can be obtained from a vein increases with the solidity of the roof—they say: "Where the roof is not good the pillars must be made larger, and a large quantity of coal is left in consequence of the roof falling and burying coal under it or cutting off available coal behind it." The percentage of coal produced from a vein likewise depends on its purity. "If the coal is in a single bed, say 6 feet thick, it will yield more than a vein of 8 or 9 feet thick containing

Summary of Data Showing the Per Cent. of Coal Won at some of the Collieries throughout the Pennsylvanian Anthracite Region.

Name of Collieries and Operators.	Particulars as to Coal Won.	Per Cent.
Keystone Colliery, Hillside Coal and Iron Co.	Coal won, including what can be got from pillar and gob	53.2
Nottingham Colliery, Lehigh & Wilkes Barre Coal Co.	Coal won, including buckwheat	41.5
" " " "	" " "	53.2
Hillman Bed, in vicinity of Wilkes-Barre	Coal won, including buckwheat	46.8
Lance Colliery, Lehigh and Wilkes-Barre Coal Co.	Coal won, exclusive of buckwheat	44.1
" " " "	Estimate of coal won, including buckwheat	48.5
Sugar Notch Breaker No. 9, Lehigh and Wilkes-Barre Coal Co.	Estimate of coal won, including buckwheat	44.6
Hollenback, No. 2, necessary to keep surface up, Lehigh and Wilkes-Barre Coal Co.	Coal won, including buckwheat	30.7
Do. Do.	" " "	36.6
Pennsylvania Coal Co.	Estimate of coal won, including buckwheat	53.2
Parrish Coal Co.	Average yield	65.8
Hammond Colliery, Philadelphia and Reading Coal and Iron Co.	Coal actually won to 1st December, 1891	38.0
	Estimate of coal won, if buckwheat had been made from commencement of mining.	39.3

the same amount of coal, but having slate through it. If the slate is distributed in the vein in large beds, which part from the coal, it will yield more coal than if the slate is distributed in many layers, or attached to the coal, or burned in, as the miners say."

They show likewise that the amount of coal to be obtained from a bed of coal depends upon its relation to other beds, and the distance above or below it. In working veins in basins with steep pitches, a large amount of coal may be lost through caving in caused by the fracture of the intervening strata. The existence of creeks and rivers likewise diminishes the quantity of coal that can be taken from the veins.

Proportion of Coal Mined to Coal Deposited.—A great many statistics are given in the report showing the percentage of coal shipped, to that contained naturally in the vein as it lies in the earth; these we consider to be of such great interest to all engaged in mining operations, whether commercially or otherwise, that we have made a tabular abstract of some of the information which is here presented.

Of course, in calculating the quantity of coal contained in the different coal veins it was necessary to decide upon a specific gravity of the coal, and we observe that the numbers the commissioners have used for this vary from 1.50 to 1.614, but from numerous experiments made lately by Mr. E. B. Coxe in his laboratory, it is concluded that the average specific gravity of the *pure* coal in all the regions is less than those used in the calculations.

We give herewith, in tabular form, an estimate of the original area and contents of the Pennsylvania anthracite fields :

Estimate of Original Area and Contents of the Anthracite Fields.

Coal Field.	Specific Gravity.	Tons per Acre per Foot.	Area in Acres.	Probable Original Contents in Tons.
Northern Coal Field	1.55	1,880	112,826.4	5,697,3870,84
Eastern Middle Coal Field	1.614	1,960	20,945	602,491,447
Western Middle Coal Field	1.614	1,960	60,190.4	4,009,564,831
Southern Coal Field { Areas 40 to 49	1.614	1,960	115,946.2	9,198,435,263
Southern Coal Field { Areas 50 to 59	1.50	1,818		
Total				19,507,872,325

The same information is included in the table of—

Totals by Regions.

Region.	Area of Lowest Workable Bed, Square Miles.	Probable Original Contents in Tons.
Wyoming	176.29	5,697,380,784
Lehigh	45.25	1,635,488,578
Schuylkill	262.67	12,175,002,963
Total	484.21	19,507,872,325

Coal Produced from the Commencement to the Present Time.—In giving the statistics of the Commissioners relating to shipments and production it is necessary to remark that it is estimated by them that the production including coal sold and consumed at collieries has exceeded the shipments by about 10 per cent.

The following table shows the total shipments and estimated production to January 1st, 1893 :

Region.	Shipments. Tons.	Production adding 10 Per Cent. Tons.
Wyoming	382,990,423	421,000,000
Lehigh	147,652,656	162,500,000
Schuylkill	289,719,916	318,500,000
Total	820,362,995	902,000,000

In basing their estimate on an average that for every ton produced 1¼ additional tons are lost, the Commissioners have calculated that the probable amount of available coal remaining in the ground is according to the following table :

Region.	Estimated Original Contents. (In round numbers) Tons.	Amount Used Up 2¼ Times Production Tons.	Estimated Contents Remaining. Tons.
Wyoming	5,700,000,000	1,052,500,000	4,647,500,000
Lehigh	1,600,000,000	406,250,000	1,193,750,000
Schuylkill	12,200,000,000	796,250,000	11,403,750,000
Total	19,500,000,000	2,255,000,000	17,245,000,000

It will thus be seen that the estimated amount of available coal contained in the whole anthracite regions is 17,245 million tons, of which quantity from the commencement in 1820 to end of 1892, 902 million tons have been extracted. As the shipments now amount to nearly 42 million tons per annum, which by adding 10 per cent. for colliery consumption will give over 46 millions as the annual production, and considering the fact that the output has doubled in quantity during the past 18 years, we will be able to calculate the approximate duration of the coal field. As regards the Northern Coal Field it was shown in the May number of 1892 of *The Colliery Engineer*, by Mr. Wm. Griffith, before he was appointed a Commissioner, that the whole of the coal contained in the field, at the rate of 24 million tons per annum, will be exhausted in 99 years. The information supplied to us then, as published in *The Colliery Engineer*, is embodied in the report.

On the Breaking and Preparation of the Coal.—Although the breaking of the coal is one of the great causes of waste, it has to be done because, as a general thing, much more lump, steamboat, broken and egg are produced naturally than can be sold, and less stove and chestnut. The breaking up of the larger sizes is effected mechanically. Pea, buckwheat, and the finer sizes must be sold as they are made, and it is impossible to diminish the quantity below a certain amount dependent upon the quantity of coal broken, and the method used for breaking it, and it must be broken because it has attached to it pieces of slate or bone which render it unfit for market. "The bony coal when ignited in large pieces, becomes coated with ashes and does not burn on the inside, leaving large masses of partially consumed material which goes out and eventually deadens the fire.

" By breaking it down the objectionable parts can be removed in the preparation, and a large amount of good marketable coal obtained.

" It seems to be pretty well demonstrated that less waste is caused when the coal is broken down by degrees, that is, when lump is broken to steamboat, steamboat to broken, broken to egg, etc., than when an effort is made to break down lump or steamboat directly into stove and chestnut."

The Commissioners make many useful suggestions and recommendations for the more complete utilization of the product of the mine.

They recommend the use of one typical size and form of car.

They say the waste can be very appreciably diminished by arranging the chutes in such a way that the coal does not rush down them, and that there are no drops in the chutes or into the pockets.

They hope that the utilization of fine coal may possibly lead to important results ; they say that there are no plants at present in operation where the powdered fuel is used commercially and successfully, but it seems from all the information that has been obtained that the more finely pulverized the coal is the more certain will be the success of the process.

A strong argument in favor of small anthracite as locomotive fuel is that a number of railroads are taking out the old fire boxes burning larger sized fuels from the engines, and replacing them with others suitable for burning smaller sized anthracite.

There has been an improvement in the construction of the breakers. The range of coal which it was possible to prepare has been much increased and the cost of preparation diminished, by the adoption of apparatus for separating the coal from slate by mechanical means. There have also been great improvements in the construction of the screens which are now made of much larger capacity, allowing a much better classification of coal.

Artificial Fuel.—The Commissioners have given much consideration to the question of the *utilization of culm for the manufacture of artificial fuel.* They point out that large quantities of this material are made in Europe, and many attempts have been made to utilize culm in this way in the United States. They say, however, that "When the fuel is to be used for manufacturing purposes, it is a serious question whether it will not be better to spend the money on an apparatus to burn the culm as it is, rather than to spend it to put the culm in shape to be burnt in an ordinary furnace. The money spent on the culm is gone when the culm is burned, while that spent on a furnace continues to be of value in utilizing the culm as long as the apparatus remains in operation.

"The manufacture of compressed fuel for domestic purposes seems to have been more successful. That most generally used is known commercially as eggettes."

How to Use the Smaller Sizes of Anthracite.—The commissioners consider that great waste is made in consequence of the want of knowledge amongst consumers in utilizing the smaller sizes of anthracite economically. They have come into use largely in consequence of their cheapness, and enterprising manufacturers and steam users have in many cases simply substituted the smaller fuel for the larger, using exactly the same kind of furnace, and in many cases the same kind of grate bar that they did for the larger coals.

"The furnace should be made to suit the fuel, and the grate bar for small coal should be so constructed that sufficient openings are left for the passage of the air; while the running of the coal through the grate bars into the ash pit is as far as possible prevented.

"It may also be stated that the finer coals should be burned with as thin a bed as possible, consistent with steady consumption, and that the fire should not be disturbed any more than is absolutely necessary. The grate surface should increase with the fineness of the coal; that is, the finer the coal the less pounds of fuel per hour can be burned economically on a square foot of grate."

The commissioners consider it important that a knowledge of the chemical composition of the coal should be acquired and that the smaller coals should be analyzed from time to time both by the producer and the consumers; this we presume is to ascertain the percentage of carbon, on which it is generally considered the calorific power of the coal so much depends.

Utilization of Culm Banks.—The commissioners have given much consideration to the value of the old culm and slate banks which have accumulated and which continue to accumulate throughout the region. The old banks are divided into three classes.

1st. Those containing only culm, that is, coal too small to be sold at the time the bank was made.

2d. Rock and slate banks consisting exclusively of rock and slate.

3d. The ordinary slate banks, consisting of various sizes of slate, coal, bony coal, and slate coal mixed.

All these substances, in addition in some cases to ashes, old lumber, manure and other refuse, have been dumped together. The commissioners suggest that in future the refuse should be dumped separately, so that the mixture of any foreign substance with the culm or slate banks may be avoided.

It is the opinion of the Commissioners that not only is the culm available, but that a very large percentage of the slate banks, if roughly sized, could be used with economy and profit for making steam, provided they are burnt where they exist, and do not have to bear much expense of transportation. The capacity of any fuel to bear transportation decreases very rapidly as the percentage of ash increases."

The percentage of coal now sent to the dirt bank is much less than formerly, but the Commissioners estimate that from the commencement of mining the *coal and coal dirt* sent to the culm banks has been 35 per cent. of the total production, equal say to 315,700,000 tons.

The Commissioners wish it to be understood that the report is merely a preliminary examination of the question.

The Permeability of Glass.

In Professor Roberts-Austen's second report to the Alloys Research Committee of the English Institution of Mechanical Engineers, he describes certain interesting experiments made by Messrs. Warburg and Tegetmeier, demonstrating the permeability of glass. It may not be generally known that the Hon. Robert Boyle published an account in 1673 of experiments made by him with a somewhat similar object. Although the conclusions which he deduced from these experiments are erroneous, yet it is interesting scientifically, as well as historically, to watch the process by which these conclusions were arrived at; and also to observe how, when once a preconceived notion had taken possession of Boyle's mind, every successive experiment led him farther from the truth.

He seems to have set out with the intention of investigating the nature of light, thinking it "worth the inquiry whether a thing so vastly diffused as light is, were something corporeal or not;" but sunbeams being scarce at that time, "because the weather proved so extraordinary dark and unseasonable, that it was wondered at;" he determined to defer the experiments with solar light, and to try what could be obtained from flame.

The account of the experiments is divided into three sections. The first is headed, "New Experiments to make Fire and Flame Ponderable;" the second, "Additional Experiments about Arresting and Weighing of Igneous Corpuscles;" and the third, "A Discovery of the Perviousness of Glass to the Ponderable Parts of Flame." The results are summarized thus: "Flame itself may be, as 'twere, incorporated with close and solid bodies, so as to increase their bulk and weight, and also that glass was permeable to the flame."

In the first set of experiments Boyle exposed small plates of silver, copper, tin, and lead severally to the direct action of the flame of burning sulphur for the space of two hours. The plates were then found to have increased in weight, the copper from 2 drachms 25 grains to 4 drachms 3 grains, the silver from 25½ grains to 1 drachm 5 grains, and an ounce of tin to 1 ounce 1 drachm. Boyle concluded that the "igneous corpuscles" had combined with the metal, and here he seems to have been not far from the truth. The following experiment might have shaken his faith in his theory, but he makes no comment on the result. A portion of powdered brick was heated in a covered crucible for two hours, but was not found to have "gain'd or lost" in the operation. An ounce of lead, heated for some time in a cupel (placed in a charcoal furnace), was found to be converted into litharge weighing 7 grains more than the lead, and an empty cupel of bone-ash and charcoal, weighing 2 ounces, was found to have increased in weight by 21 grains, after being heated in a muffle for two hours.

"Whether I should have been able by reduction, specifick gravity, or any of the other ways which I had in my thoughts, to make any discovery of the nature of the substance that made the increment of weight in our ignited bodies; the want as well of leisure as of accommodions requisite to go through with so difficult a task, keeps me from pretending to know."

The second set of experiments dealt with metals inclosed in glass retorts heated over a charcoal fire. Boyle found that 8 ounces of tin kept in a melted state in an open glass vial for an hour had gained in weight 18 grains. He says: "Although these tryals might well satisfye a person not very scrupulous, yet to convince even those that are so, I undertook, in spite of the difficulties of the attempt, to make the experiment in glasses hermetically seal'd to prevent all suspition of any access of weight accruing to the metal from any smoak or saline particles getting in at the mouth of the vessel."

The first retort burst, but another with a long neck sealed at the end, and containing 8 ounces of tin, was held over the fire, so as to keep the metal fused for an hour and a quarter, "as (being hinder'd by a company of strangers from being present) my laborant affirm'd." The metal remaining, and the "calx" which Boyle elsewhere describes as "an aggregate of metal and extinguished flame," were found to weigh 8 ounces, 23 grains. To show that metals are not the only bodies capable of receiving increase of weight from a fire, he tried the effect of similar treatment on coral and quicklime, both of which showed an increase in weight. He quaintly argues concerning lime that, "though well-made lime be usually observ'd to be much lighter than the stones whereof 'tis made, yet this lightness does not necessarily prove that because a burnt limestone has lost much of its matter by the fire, it has therefore acquired no matter from the fire, but only infers that it has lost far more than it has got."

In the third set of experiments the substances were submitted to the heat of flames, "that I might obviate some needless scruples that may

be entertain'd by suspitious wits upon this circustance of our additional experiments. That the glasses employ'd about them were not exposed to the action of mere flame, but were held on charcoals (which to some may seem to contain but a grosser kind of fire.")

To this end he exposed a retort containing 2 ounces of tin to the flame of burning sulphur for 3½ hours, "as the laborant inform'd me (the smell of brimstone, being peculiarly offensive to me, forbidding me to be present)." The increase in weight being 4½ grains, "if both the laborant and I be not mistaken, for the paper which should inform us is now missing." Boyle seems to have been just a little careless with this experiment, but his frankness is admirable.

To make sure that the increase in weight was not due to particles of the glass itself, separated "and forcibly driven into the inclos'd body by the heat," he weighed two empty retorts before and after heating. One retort seems to have gained ¼ grain, but he says, "there was no likelihood at all that so considerable increase of weight (as that observed in the other experiments) should proceed from the glass itself and not from the fire." As a mere matter of probability, one would have thought the former supposition to be the more reasonable of the two. It seems a pity that Boyle did not weigh his retorts and their contents separately and together before and after heating. If he had, the discovery of oxygen might have been made 100 years earlier than it was, but he seems, by a sort of fatality, to have continually missed the paths that might have led him to that result.

In his subsequent experiments the fuel used was spirits of wine, as affording a purer flame than that of sulphur. An ounce of tin filings was melted in a sealed retort, and exposed to the heat of a spirit lamp for two hours, at the end of which time the metal and "calx" had gained 4½ grains, "besides the dust that had stuck to the sides of the retort which we reckoned enough to make ½ grain more, so that of so fine and pure a flame as of this totally ardent spirit, enough to amount to 5 grains was arrested, and in good measure fix'd by its operation on the tin it had wrought upon. Whence can this increase of absolute weight (for I speak not of specifick gravity) observ'd by us in the metals expos'd to the mere flame to be deduc'd, but from some ponderable part of that flame? And how could those parts invade those in the metal inclos'd in a glass otherwise than by passing through the pores of that glass?" Reasoning unanswerable until 1774, when Priestly's discovery of oxygen cleared away this and many another fallacy. To a person ignorant of the existence of oxygen, Boyle's reasoning would appear conclusive, but to us it will only appear strange that he was not led by his experiments to make the discovery which Priestly made 100 years later.

More than once he came very near, but each time he almost wilfully shut his eyes to it. He does not seem to have had the faintest suspicion at any time of the possibility of the increment of weight coming from the atmosphere.

There is another line of investigation, which one regrets the philosopher did not follow up, although he mentions it in a "corollary" as follows: "Whether these igneous corpuscles do stick after the like manner to the parts of meat, drest by the help of fire, and especially roast meat, which is more immediately expos'd to the action of the fire, may be a question which I shall now leave undiscuss'd, because I think it difficult to be determin'd, though, otherwise, it seems worthy to be consider'd, in regard it may concern men's health to know whether the coction of meat be made by the fire, only as 'tis a very hot body, or whether it permanently communicates anything of its substance to the meat exposed to it."

The Commercial Production of Ozone.

The value of ozone as a deodorizer and disinfectant is well known, and it is conceded by all who are familiar with its character that it is capable of rendering many valuable services, not only for therapeutic or sanitary purposes, but in chemistry and several industrial processes. The difficulty, however, has hitherto been the economical production of this valuable agent on a commercial scale. The subject has for many years past formed the study of most of the leading chemists of this and other countries. Bunsen, years ago, pointed out that there were hundreds of uses for ozone if only it could be made in large quantities at a low price; while Faraday, in 1851, in a lecture before the Royal Society, pointed out a number of useful results attending its use, and affirmed it to be a most ready and powerful oxidizer. The late Dr. Werner Siemens appears to have been the first, in 1857, to construct an electrical ozoning tube, and he has been followed by Von Babo, Beanes, Ladd and many others. The practical results, however, appear to have been but limited, and the only outcome, so far as we are aware, is the production of small quantities of ozone in closed tubes, and its limited use in some of the hospitals on the Continent. Among others who have closely followed up this question is M. Emile Andreoli, whose researches have led to the perfecting by him of a system of producing ozone on a practical commercial scale with, it is stated, marked economy.

In this process, metallic open ozonizers are used, in contradistinction to the closed and delicately constructed glass apparatus hitherto employed. An alternating current is produced by a dynamo, and is conducted to a transformer, which converts it from the ordinary pressure of, say, 100 volts to 8,000 or 10,000 volts. This high tension current is conducted to metallic electrodes, which are constructed with thousands of points, and a condenser charge is obtained by means of which the oxygen around the points is condensed or ozonized. M. Andreoli found that ozone was generated in far larger quantities by means of point-bearing electrodes than when the electrodes are flat surfaces on which the tension is weak and uniform. The electric tension is at its maximum when there are sharp points from which the discharge escapes, so to speak, in a continuous flow. In one form of ozonizer he uses a series of metallic tapes of small section—each edge of which is serrated like a saw, the tapes being strung, gridiron fashion, in a frame. The points give a much higher percentage of oxygen ozonized, a full 6 per cent. of the oxygen of the air being ozonized, it is stated, at the ordinary temperature and under ordinary conditions by M. Andreoli's apparatus. Other forms of ozonizers are also employed by him for particular purposes and for utilizing a continuous current. The visible effects of the change, as seen in the dark, are manifested by a beautiful violet glow, the presence of ozone being strongly apparent to the sense of smell. It was Van Marum who, in 1785, first detected this smell, which he produced by the passage of electric sparks through the air, and it was Schonhein who, in 1840, gave the odor the name of ozone, when he produced it from electrolytic oxygen. Marignac and De la Rue discovered its true elementary composition later on, and Andreoli appears to have solved the question of producing it economically on a commercial scale more than a century after the first detection of its odor.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

We are indebted to Secretary Britton, of the Pacific Coast Gas Association, for the following newsy mention respecting the banquet enjoyed by the members and guests at the Maison Riche:

After adjournment on the afternoon of the first day (July 11th), the members met at at the Maison Riche, as guests of the San Francisco Gas Light Company, and did ample justice to the elegant spread prepared for them. During the demolition of the dinner appropriate toasts were proposed and responded to, the President of the Association (Mr. Joseph B. Crockett) acting as toastmaster in his usual happy way. The latent wit of the whilom austere gas man was brought out in large quantities, the stand-pipes of their eloquence were cleaned out, the retort carbonized their merriment, and the fun flowed fast. In explanation of the seal of the Association,

Seal of the Pacific Coast Gas Association.

unique in its way, Mr. E. C. Jones stated that it was designed from a form made by his father in the early days of gas lighting in Massachusetts, and represented a perfect circulation of gas—no dead ends, the ultimate aim and object of every gas man—and that the burner in the center of the seal was emblematic of the point that every gas engineer works to—the ignition of the gas. The unanimous thanks of the Association were tendered to Messrs. Jones and Crockett and to the San Francisco Gas Light Company, for their efforts to make, and their zeal in making the Pacific Coast Gas Association a success. The morning sun, which had awakened the Eastern gas men many hours before, was coming over the Sierra Nevadas before the congratulation to and the baptism of the new infant had been fully accomplished.

"A. S. W.," writing to the Journal, under date of July 31st, remarks: "I have often been advised to get a chance to run a small gas works, where I might assume full control and become inured to a bur-

den of responsibility; but it has always seemed to me that a subordinate position in a large city was more to be desired, on account of its opportunities for learning the best experiences of competent men. In 1890 I was working on the leakage problem in a growing manufacturing city in Western New York, and, between April and October, had been over all the suspicious mains of a large system. When the frost had stopped all further street work, I came into the office to make maps from the notes and measurements taken during the summer. One day in early December an owner of a coal gas works in some small place—a sort of flag station on the Erie Canal—came to our office and told the manager he was looking for a man to run his plant. The manager very kindly recommended me, whereupon I was called in to be interviewed. After reciting in a general way the extent and description of his plant, the owner asked what salary I would expect if I agreed to take charge. I mentioned a reasonable figure, but it seemed too large for his ideas. He then asked if he might make an offer to some of the men around the works, and get one to do the hard work, while he would keep the accounts. On receiving permission he went through the retort house, and selected a fireman, named John Kuhn, who was a good man and a faithful worker. John went, taking his family along, and we heard nothing from him until in the latter part of the next spring, when he came to pay us a call. I asked him how he was getting along, to which he replied: 'Pretty well; we have two benches of 5's. I fire days, the wife fires nights, the boys take meters, and Sundays we all turn in and lay pipe!'"

THE following correspondence explains itself:

"BOSTON, August 1, 1893.

"I note your recent reference to the reduced gas rate at South Framingham, Mass., and beg leave to call your attention to these facts, which presentment I also some days ago caused to be published in the Boston *Herald*. In respect of the experiment now being made at Framingham of selling uncarbureted water gas at 40 cents per 1,000 cubic feet, the claim is made that at this price the Company can make a good return on the capital invested. By a reference to the last printed report of the State Board of Gas and Electric Light Commissioners, it will be found that the Framingham Company, during the year ended June 30, 1892, sold 6,749,800 cubic feet of gas, and that the total operating expenses were $7,354 35, or $1.09 per 1,000 cubic feet. Moreover, the Company has issued bonds on which the interest for the year amounts to $4,500, or 66.6 cents more per 1,000 feet, or a cost to the Company, including interest, of $1,775. To meet this cost the Company had as receipts from the sale of gas $3,522.68, or 52.2 cents per 1,000 feet, showing before the present reduction a loss of $1.233 on every 1,000 feet of gas sold, without allowing anything for dividends on the $75,000 of stock which this Company has. From the consumers' standpoint, there must also be taken into consideration the fact that in order to secure light from this gas (which burns only with a blue flame), additional appliances must be provided and renewed at frequent intervals, making additional expense and considerable trouble. If the gas is to be sold for heating and cooking purposes, there must be used 2½ times as much of this Framingham gas as of Boston gas, since the former only has about 275 heat units to the foot as compared with the latter's units; or, in other words, 1,000 feet of the gas supplied in Boston for $1 will do exactly the same amount of work as 2,500 feet of the gas supplied in Framingham costing $1.—A. B. C."

AN agreement has been reached between the authorities of Annapolis, Md., and the Annapolis Gas and Electric Light Company respecting the public lighting of that place. The respective parties have been trying to bring about this result for something like three years.

MR. V. L. ELBERT, writing to the JOURNAL from Chicago, under date of July 27th, 1893, says:

To the Editor AMERICAN GAS LIGHT JOURNAL: I enclose you a clipping from the *Herald*, which is a correct report of the drowning of my friend, Mr. Peter E. De Mill. Having been out of the city since then, please excuse delay in sending this account. I have known De Mill as long as I can remember, we having been raised in Detroit, Mich. Deceased was thoroughly accustomed to the waters of the Lakes, having sailed over them constantly. Mr. De Mill spent the afternoon of June the 26th with me at my home here and was in the best of spirits. He had just come on to Chicago from a trip to New York, Cincinnati and elsewhere. After leaving college Mr. De Mill was engaged as Manager of the Dallas (Tex.) Gas Works, where he remained for several years. In 1881 he was chosen as the Engineer of the Central Gas Company, at San Francisco, which was then the newest opposition Company in that city, and which is now leased by the Pacific Gas Improvement Company. In 1883, he went to Oregon as Engineer for the same firm of contractors that constructed the Central Works, and the writer accompanied him. At this period were constructed the works at East Portland and Astoria. The writer left them in July, 1883, to accept the position of Manager of the Jackson (Mich.) Gas Company—the original Company—and in 1884, Mr. De Mill came east for a short engagement at Omaha with the Gas Company there. In 1885 or 1886, he, in partnership with his brother-in-law (Mr. George W. Moon, of Detroit) obtained a franchise for and constructed the Works of the Alpena (Mich.) Gas Company, in which he retained an interest at the time of his death. In August, 1890, Mr. De Mill was again sent for to visit the Pacific Coast, for the purpose of constructing the gas plant of the San Jose (Cal.) Light, Heat and Power Company, which task he successfully completed in January, 1892. He returned East in May, 1892, to attend the last illness of his mother, and in November last he beheld the death of his father, Mr. Peter E. De Mill, Sr., who had been Superintendent of the Detroit Gas Company for 20 years. Deceased was an active member of the Western Gas Association, and always took a deep interest in its welfare. He was a man who made many friends and kept them, and my belief that his friends will appreciate this short sketch of his life is that which prompted its preparation.

THE clipping inclosed by Mr. Elbert (it is taken from the Chicago *Herald* of June 29th) is appended: "Mr. Peter E. De Mill, a wealthy Detroit man, was drowned in the Lake, opposite the mouth of the river, Tuesday night (June 27th), at 7:30 o'clock. Mr. De Mill was visiting the Exposition as a guest of Fred. W. Job, an old college friend, now a Chicago lawyer. Tuesday evening Mr. Job and his friend accompanied Capt. Edgecomb, Alexander Dunham and Edward Veasey on a yachting cruise on the Lake. They cruised off the World's Fair grounds enjoying the bracing evening breeze, telling stories and reviving old college experiences. The Chicago lawyer was telling an anecdote, when his Detroit friend remarked he had heard that before and left the party, going to the stern of the boat. The story was told, and the yachtsmen enjoyed a hearty laugh over the point. Their happiness was suddenly changed to alarm, however, by the Captain exclaiming, as he looked over the stern of the boat: 'There's a man overboard.' The men in the party rushed to the stern and there saw their companion, De Mill, swimming in the Lake 200 feet in their wake. The engine was quickly reversed and the boat backed to the assistance of the man in the water. He seemed to be swimming very easily, and the men in the boat were reassured, believing that he could readily be got out of the water and that he would be none the worse for his wetting with the exception of his soiled clothes. His friend, Mr. Job, however, was on the deck over the screw before the boat reached the swimmer, with a line to throw to him. This he did, but the man in the water seemed to make no effort to grab it. Then life preservers were thrown to him, and although they were easily within reach, he made no effort to utilize them. The men in the boat were greatly alarmed at De Mill's evident helplessness. A lifeboat was launched and two of the crew rowed toward him, but before they reached him he sank. His companions watched anxiously for him to come to the surface, but he did not rise. He had drowned with his friends looking at him powerless to help. The steam launch in which the party were cruising was the Mina, owned by L. R. Giddings, of Chicago. It is thought that Mr. De Mill was standing on the deck over the screw when the pitching and rolling of the boat threw him into the Lake. The wind was fresh and the boat was making a quartering course toward the harbor. It was neither running with the sea nor against it, and the uncertain motion of the boat, it is believed, is what caused Mr. De Mill to be thrown overboard. He was a good swimmer, but his sudden plunge into the cold Lake is thought to have paralyzed his muscles. Mr. De Mill was well known in Detroit, having lived there since his birth 40 years ago. He was of an old Detroit family and inherited much wealth from his parents, both of whom are dead. Considerable real estate in Chicago was owned by him, and he was also largely interested in gas companies in Alpena, Mich., and in California. He was educated at the University of Michigan, graduating from that institution in 1876, and having membership in the Sigma Phi fraternity. He was a bachelor, and leaves two sisters, both of whom live in Detroit."

WE regret to report the accidental death of Louis Mitchell, son of Mr. Kerr Murray Mitchell, General Superintendent of the St. Joseph (Mo.) Gas and Manufacturing Company. Deceased, who was a bright, lovable lad, and in the 8th year of his age, while romping in the neighborhood of a railway freight yard, fell in front of a moving train.

MR. E. C. BENEDICT, speaking of the rumor recently put forth that the Chicago Gas Company would not only issue $10,000,000 bonds for

construction purposes, but that it would also pass the next dividend, said: "There is nothing whatever the matter with Chicago gas. The Company, in my judgment, will earn $100,000 net cash more than last year, which will be over $2,000,000 after paying all interest charges, or more than 8 per cent. on the Fidelity Company's certificates. The Company's business this year will exceed by 20 per cent. that of last year, and this growth necessarliy involves a larger increase of plant than usual and perhaps will call for the expenditure of $1,500,000. To expect that the $2,000,000 of net earnings will provide for $1,500,000 of dividends and $1,500,000 of construction is simply ridiculous. To sell bonds that earn approximately three times their interest at prevailing rates would be suicidal and will not be entertained by the management. To create a floating debt at such times as these would be bad judgment. The question of the dividend does not come up from four to six weeks and the managers will be governed at that meeting by the conditions then prevailing as to what course they will adopt in the matter."

THE following communication was recently sent by Mayor Matthews, of Boston, to the State Board of Gas and Electric Light Commissioners:

"The undersigned, Mayor of the city of Boston, a city in which the Charlestown Gas Light Company is located and doing business, hereby complains that the prices charged by said Company for gas to the residents of Charlestown and Somerville are excessive; and therefore petitions your Honorable Board that you will order the prices charged by said Company reduced to such figure as upon investigation and trial before your Honorable Board shall be found reasonable and proper. And the undersigned further petitions for an inspection of all the returns in the possession of your Honorable Board made by the Charlestown Gas Light Company.—N. MATTHEWS, JR."

THE New England Peat, Fuel and Gas Company has been granted permission by the proprietors of the Cambridge (Mass.) Gas Light Company to set up an experimental plant on the premises of the latter Company for the purpose of determining whether the former's system of gas making possesses any merit. The expense of the experiment will be borne by the Peat, Fuel, etc., Company.

MESSRS. C. D. KINNEY AND H. D. CLARK have secured the contract for making ready the foundation and tank for the new gasholder to be constructed by the New Haven (Conn.) Company.

THE Greenfield (Mass.) Gas Company has declared a dividend of 2 per cent. on the common stock, and the holders of the preferred shares are to receive 3 per cent. out of the earnings for the past half year.

A BOILER explosion is responsible for the demolition of the power house of the Waco (Texas) Gas and Electric Light Company.

ON July 29th Messrs. B. S. Church, of New York, and R. H. Brown, of Macon, arbitrators for the city of Macon, Ga., and Capt. William Henry White, of New York, and E. H. Jenkins, of Columbus, Ga., arbitrators for the Macon Gas and Water Company, met at the office of R. H. Brown and selected the three remaining arbitrators, making seven in all, necessary under the provisions of the act authorizing the city to purchase the water works. This makes the board of arbitrators stand as follows: The three chosen were Thomas Hendley, W. G. Solomon and T. C. Hendrix. Mr. Brown was chosen Chairman and Mr. Hendley was appointed Secretary, after which the Board adjourned subject to the call of the Chairman. The valuation meanwhile is being prepared.

THE Common Council of Buffalo has been complaining of the negligence exhibited by the Board of Public Works in not complying with the ordinances that require the candle power and purity of the gas supplied by the local Companies to be tested at stated intervals, but without apparent good reason therefor. City Chemist Hill is not only willing but anxious to go ahead; in fact he only waits because the Common Council has neglected to vote an appropriation for the purchase of certain apparatus absolutely necessary to the carrying out of the tests.

MR. FRANK COLLINS has been appointed electrician to the Mascoma Electric Light and Gas Company, White River Junction, Vt.

AT a meeting of the Youngstown (Ohio) Gas Company and the Mahoning Electric Light Company, Mr. George Tod, who has served the Gas Company as President for the past 20 years, resigned. He was succeeded by Mr. W. E. Taylor. Mr. E. P. Holmes was chosen General Manager.

IN our last we made brief mention of the death of Mr. Socrates Newman, and we supplement that notice with the following short sketch of his life, for the particulars of which we are indebted to Mr. Frederic Egner:

Mr. Newman was one of the best known citizens of St. Louis, and for years was the President of the St. Louis Gas Light Company, one of the strongest and wealthiest corporations ever organized under the laws of the State. He was born in New York about 65 years ago and came to St. Louis early in the sixties. For years he was engaged in the insurance business and retired in 1873 from that field, or when he was appointed receiver of the St. Louis Gas Company. From the receivership he attained the Presidency of the reorganized Company, and held it until the reorganization came under the McMillin *regime*. Mr. Newman had been in ill-health long before this, and, relieved of his responsibilities, he went to Florida, remaining there for some time. Some years ago Mr. Newman erected a cottage at Arcadia near Ironton, Mo., and has spent his summers there ever since. He left several weeks ago with several members of his family, with the intention of remaining until September. He was then suffering from asthma, but the attack was not considered dangerous by his physician. He seemed to improve until a day or two ago, when adverse symptoms were shown and his family was then informed that his condition was serious. He leaves a widow and several children.

MR. A. M. SUTHERLAND reports that he is under contract to install a "little giant" water gas generator on the plant of the Gainesville (Fla.) Gas and Electric Light Company, the machine to have a capacity of 100,000 cubic feet per day. The Gainesville folks are also putting in new scrubbing and purifying apparatus, and the improvements are to be completed by October 1st.

A "LITTLE giant" set is also under way at the gas plant of the Clifton Springs (N. Y.) Sanitarium. It is to have a capacity of 150,000 cubic feet per diem. New scrubbers are also to be erected.

THE voters of Hingham, Mass., having held the two elections (both ballots were in the affirmative) necessary under the statutes to enable municipalities to engage in the manufacture and distribution of gas and electricity, a committee, consisting of Messrs. Fred. M. Hersey, George W. Burr, C. Sumner Cushing, Ebed L. Ripley and Morris F. Whiton, was appointed to proceed with the establishment of an electric light plant, and the Town Treasurer was authorized to issue bonds or notes to be approved by the Selectmen to the amount of $50,000, payable in not less than 10 or more than 30 years, at a rate not to exceed 4 per cent.

THE authorities of Bakersfield (Cal.) have reduced the fire tax assessment of the Bakersfield Gas and Electric Light Company from $16,000 to $7,000.

MR. EDWARD BYRNE, for many years connected with the Citizens Gas Light Company, of Brooklyn, N. Y., died at his home in that city on the afternoon of the 31st July. Deceased, who was in his 72d year, was the father of Mr. Thomas E. Byrne, Engineer to the Citizens Company. Interment was made in Flatbush on the morning of Aug. 2.

THE Village Trustees of Ballston Spa N.Y., have again refused to grant an exclusive franchise to Messrs. Kennedy & Waldorf, of Johnstown, N.Y., to supply natural or illuminating gas to the residents of the Spa.

THE State Board of Gas and Electric Light Commissioners have notified Mayor Marsh, of Worcester, Mass., that the first hearing on the petition for an order to declare the Worcester gas rate excessive will be had at an early date in September.

IN the annual report of the Superintendent of Lamps, for Washington, D. C., which was handed to the District Commissioners some days ago, the Superintendent gives it as his opinion that every street and avenue traversed by steam railroads should be lighted by electricity, and he also claims that a much better illuminating service at considerably reduced expense could be obtained by the District of Columbia if its gas and oil service were maintained on a yearly contract basis, the work of lighting and extinguishing to be done by employees in the pay of the District. The Superintendent also gives it as his belief that the rates charged for electricity are at least 25 per cent. in excess of a fair price. He recommends that naphtha or gasoline lamps be substituted for the kerosene lamps at present used in some of the suburban districts.

THE new electric equipment for the Oakland (Cal.) Gas Light and Heat Company will be installed in a building on the Grove street site. The dimensions of the structure will be 80 feet by 120 feet. It is calculated to place two vertical compound condensing engines of 400 horse power each, and the entire equipment is to be equal to the maintenance of 1,500 arcs and 10,000 incandescents.

MR. JOHN SIMPSON, who for the past two years has acted as Mine Superintendent for the Youghiogeny Gas Coal Company, at Monongahela, Pa., has accepted a similar berth in the service of the James W. Ellsworth Company at the Forest Hill mine.

THE plant of the Ionia (Mich.) Gas Company is to be enlarged. The business of this Company increases rapidly.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

EDITOR—Jos. R. Thomas, C.E.
ASST. EDITOR—T. J. Cunningham.
MANAGER—C. E. Sanderson.

MONDAY, AUGUST 7, 1893.

The Market for Gas Securities.

The market for gas shares is just now like the market for anything else—there is no market, nothing but a shambles. Every one seems to be willing to sell; nobody wants to buy, unless at figures lower than those quoted before. Consolidated sold down as low as 108 during the week, but it also sold as high as 120½. On the Exchange for the past week 3,000 shares were traded in. Equitable is weak and drooping, at 145 to 155, and the same may be said of Mutual, which is quoted at 130 to 138. These figures, however, are merely nominal. The opening in Consolidated to-day (Friday) was 120 to 120½. Brooklyn shares are absolutely featureless, and the figures given have no real meaning as to the values of the securities. Insiders claim that the consolidation is virtually an assured fact, and that the new year will see its completion. Perhaps! Chicago gas was traded in during the week to the extent of 262,500 shares—rather more than the entire capital stock—and the maximum and minimum quotations were 53 39 respectively. The opening to-day was made at 47. Baltimore Consolidated is reported at 51½ to 52, and Bay State is offered at 11¼.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,
16 WALL ST., NEW YORK CITY.
AUGUST 7.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	120	120½
Central	500,000	50	90	95
" Scrip	220,000	—	—	100
Equitable	4,000,000	100	145	155
" Bonds	1,000,000	—	106	108
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	115
Mutual	3,500,000	100	130	138
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Standard Gas Co—				
Common Stock	5,000,000	100	35	40
Preferred	5,000,000	100	80	85
Yonkers		50	112	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	—	113
Citizens	1,200,000	20	99¾	100
" S. F. Bonds	320,000	1000	—	103
Equity Gas Light Co.	2,000,000	100	—	—
Bonds	1,000,000	—	—	60
Fulton Municipal	3,000,000	100	125	—
" Bonds	300,000		102	—
Peoples	1,000,000	10	—	92
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	870,000	100	—	123
" Bonds (5's)	70,000	—	100	—
Nassau	1,000,000	25	150	—
" Ctfs	700,000	1000	99	100
Williamsburgh	1,000,000	50	130	—
" Bonds	1,000,000	—	107	110
Out of Town Gas Companies.				
Boston United Gas Co.—				
1st Series S.F. Trust	7,000,000	1000	65	—
2d " " "	3,000,000	1000	44	45
Bay State Gas Co.—				
Stock	5,000,000	50	10	—
Income Bonds	2,000,000	1000	40	—
Buffalo Mutual, N. Y.	750,000	100	110	—
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
Chicago Gas Company.	25,000,000	100	46⅞	47
Chicago Gas Light. & Coke Co.—				
G't'd Gold Bonds	7,650,000	1000	85	90½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1000	—	101
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	—	108
2d "	2,500,000	1000	104	105
Consumers Gas Light Co., Jersey City	2,000,000	100	25	—
Bonds	600,000	1000	85	90
Cincinnati G. & C. Co.	7,000,000	100	192	—
Consumers Toronto	1,600,000	50	190	191
Central, S. F., Cal.			—	100
Capital, Sacramento, Cal			—	55
Consolidated, Balt.	11,000,000	100	51½	52
" Bonds	6,400,000		107	107½
Citizens Gas Lt. Co., Rochester, N. Y.	500,000	—	85	101
Bonds	250,000		—	—
Detroit Gas Co.—				
1st Mortgage			85	87
East River Gas Co., Long Island City	1,000,000	100	100	105
Bonds	500,000	100	100	102
Hartford, Conn.	750,000	25	120	128
Jersey City	750,000	20	190	200
Laclede Gas Light Co., St. Louis, Mo.—				
Common Stock	7,500,000	100	11½	13
Preferred "	2,500,000	100	45	55
Bonds	9,034,400	1000	70½	71½
Louisville, Ky.	2,570,000	50	125	130
Little Falls, N. Y.	50,000	100	—	100
" Bonds	25,000	—	100	103
Montreal, Canada	2,000,000	100	200	208
Memphis (Tenn.) Gas	750,000	100	30	—
" Bonds.	240,000	100	103	—
New Haven, Conn.		25	200	—
Oakland, Cal.			42⅝	43
Peoples, Jersey City		—	160	170
" " Bonds.			—	—
Paterson, N. J.		25	99	102
Rochester, N. Y.		50	80	85
Preferred			90	95
Bonds			90	95
Syracuse, N. Y.	500,000	25	—	—
San Francisco Gas Co. San Francisco, Cal.	10,000,000	100	71½	72¼
Washington, D. C.	2,000,000	20	240	240
Wilmington, Del.		50	59	88

Advertisers Index.

GAS ENGINEERS. Page
Jos. R. Thomas, New York City 205
Wm. Henry White, New York City 211
Fred. Bredel, New York City 207
H. C. Slaney, New York City 205
Frederic Egner & Co., St. Louis, Mo 210
Geo. R. Rowland, Brooklyn, N. Y. 205
Jas. R. Smedberg, Chicago, Ills 205

CHEMISTS.
Durand Woodman, New York City 196
E. G. Love, New York City 202

PROCESSES.
Bartlett, Hayward & Co., Baltimore, Md 209
United Gas Improvement Co., Phila, Pa 201
Burdett Loomis, Hartford, Conn 211
National Gas and Water Co., Chicago, Ills 203
Economical Gas Apparatus Construction Co., Toronto, Ont. 202
The Western Gas Construction Co., Fort Wayne, Ind 202

GAS WORKS APPARATUS AND CONSTRUCTION.
James R. Floyd & Sons, New York City 211
Continental Iron Works, Brooklyn, N. Y 196
Delly & Fowler, Phila., Pa 211
Kerr Murray Mfg. Co., Fort Wayne, Ind 172
Stacey Mfg. Co., Cincinnati, Ohio 211
Bartlett, Hayward & Co., Baltimore, Md 209
Davis & Farnum Mfg. Co., Waltham, Mass 208
R. D. Wood & Co., Phila., Pa 210
Bouton Foundry Co., Chicago, Ills 211
Isbell-Porter Company, New York City 210
Fred. Bredel, New York City 207
United Gas Improvement Co., Phila., Pa 201
Berlin Iron Bridge Company East Berlin, Conn 198
National Gas and Water Co., Chicago, Ills 203
Frederic Egner & Co., St. Louis, Mo 210
Economical Gas Apparatus Construction Co., Toronto, Ont. 202
The Western Gas Construction Co, Fort Wayne, Ind 202

GAS AND WATER PIPES.
Mellett Foundry and Machine Co., Reading, Pa. (John Fox, Selling Agent, N. Y.) 213
Ohio Pipe Co., Columbus, Ohio 213
M. J. Drummond, New York City 213
R. D. Wood & Co., Phila., Pa 210
Warren Foundry & Machine Co., New York City 213
Donaldson Iron Co., Emaus, Pa 213
Addyston Pipe and Steel Co., Cincinnati, O. 213

STEAM BLOWER FOR BURNING BREEZE.
H. E. Parson, New York City 207

GAS COALS.
Penn Gas Coal Co., Phila., Pa 207
Perkins & Co., New York City 204
Despard Coal Coal, Baltimore, Md 205
Chesapeake and Ohio R. R. Coal Agency, N. Y. City 205
Westmoreland Coal Company, Phila., Pa 205
J. & W. Wood, New York City 204
Henry C. Scheel, New York City 205

CANNEL COALS.
Perkins & Co., New York City 204
J. & W. Wood, New York City 204
Henry C. Scheel, New York City 205

GAS ENRICHERS.
Standard Oil Co., Cleveland, Ohio 205

COKE CRUSHER.
C. M. Keller, Columbus, Ind 204

INCLINED RETORTS.
Parker-Russell M'ning and Mfg. Co., St. Louis, Mo 205

RETORTS AND FIREBRICK.
J. H. Gautier & Co., Jersey City, N. J 206
B. Kreischer & Sons, New York City 206
Adam Weber, New York City 206
Laclede Fire Brick Mfg. Co, St. Louis, Mo 206
Borgner & O'Brien, Phila., Pa 206
James Gardner, Jr., Pittsburgh, Pa 203
Henry Maurer & Son, New York City 206
Baltimore Retort and Fire Brick Co., Baltimore, Md. 206
Parker-Russell Mining and Mfg. Co., St. Louis, Mo 203
Brooklyn Fire Brick Works, Brooklyn, N. Y 206

GASHOLDER TANKS.
W. C. Whyte, New York City 209
J. P. Whittier, Brooklyn, N. Y 207

GASHOLDER PAINT.
The Government Waterproof Paint Co., Boston, Mass 196

CEMENTS.
C. L. Gerould & Co., Brooklyn, N. Y 206

SCRUBBERS AND CONDENSERS.
G. Shepard Page's Sons, New York City 176
R. D. Wood & Co., Phila., Pa 210
James R. Floyd & Sons, New York City 212
Continental Iron Works, Brooklyn, N. Y 196

REGENERATIVE FURNACES.
Bartlett, Hayward & Co., Baltimore, Md 209
Fred. Bredel, New York City 207
J. H. Gautier & Co., Jersey City, N. J 207
Parker-Russell Mining and Mfg. Co., St. Louis, Mo 206

GAS GOVERNORS.
Connelly Iron Sponge and Governor Co., New York City 203
Wilbraham Baker Blower Co., Phila., Pa 208

GAS GAUGES.

The Bristols' Mf'g. Co., Waterbury, Conn..... 202

TAR AND CARBONIC ACID EXTRACTOR.

Geo. Shepard Page's Sons, N. Y. City..... 212

AMMONIA CONCENTRATOR.

Michigan Ammonia Works, Detroit, Mich..... 195

GAS METERS.

John J. Griffin & Co., Phila., Pa..... 214
American Meter Co., New York and Philadelphia..... 215
The Goodwin Meter Co., Philadelphia, Pa..... 180
Helme & McIlhenny, Phila., Pa..... 215
D. McDonald & Co., Albany, N. Y..... 215
Nathaniel Tufts, Boston, Mass..... 214
Maryland Meter and Manufacturing Co., Baltimore, Md.... 214
Harris Bros. & Co., Philadelphia, Pa..... 214
Keystone Meter Co., Royersford, Pa..... 215
Metric Metal Co , Erie, Pa..... 213

SELF-SEALING MOUTHPIECE DOORS.

Isbell-Porter Company, New York City..... 210
Continental Iron Works, Brooklyn, N. Y..... 196

INCANDESCENT GAS LAMPS.

Welsbach Light Co., Gloucester City, N. J.. 198

BURNERS.

C. A. Gefrorer, Phila., Pa.... 195
Moses G. Wilder, Phila., Pa..... 195

STREET LAMPS.

J. G. Miner, Morrisania. New York City 207
Bartlett Street Lamp Mfg. Co., New York City..... 207

PURIFYING MATERIAL.

Connelly Iron Sponge and Governor Co., New York City... 203
Greenpoint Chemical Works, Brooklyn, N. Y..... 203
Henry W. Douglas, Ann Arbor, Mich..... 203

ELECTRICAL APPARATUS.

Wm. Henry White, N. Y. City..... 211

EXHAUSTERS.

The P. H. & F. M. Roots Co., Connersville, Ind..... 200
Isbell-Porter Company, New York City..... 210
Wilbraham Baker Blower Co., Philadelphia, Pa..... 203
Connelly Iron Sponge and Governor Co., New York City.... 203
The Connersville Blower Co., Connersville, Ind..... 200

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y..... 195
Chapman Valve Manufacturing Co., Boston, Mass..... 195
R. D. Wood & Co., Phila., Pa..... 210
The P. H. & F. M. Roots Co., Connersville, Ind..... 128
Continental Iron Works, Brooklyn, N. Y..... 196

GAS ENGINES.

Schleicher, Schumm & Co., Phila., Pa..... . 216
Safety Vapor Engine Company, New York City..... 195

ENGINES AND BOILERS.

The Hazelton Boiler Co., New York City..... 197

PURIFIER SCREENS.

John Cabot, New York City..... 202

GAS STOVES.

American Meter Co., New York and Philadelphia..... 199
The Goodwin Meter Co., Phila., Pa 180
George M. Clark & Co., Chicago, Ill's 197
Maryland Meter and Manufacturing Co., Baltimore, Md.... 214
The Schneider & Trenkamp Co., Cleveland, O.... ... 196

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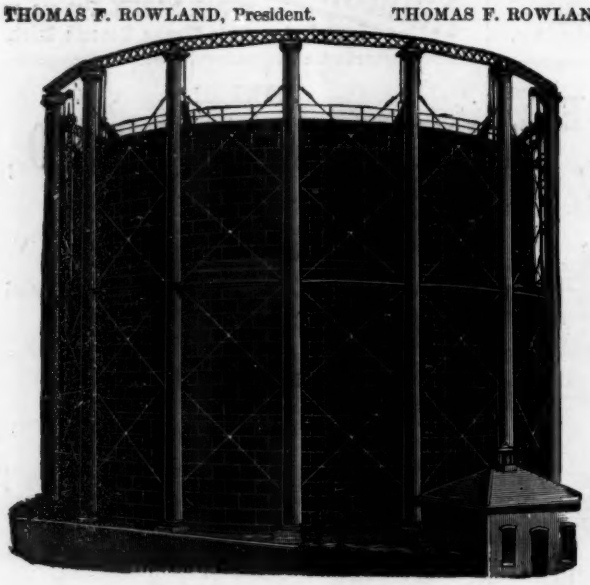

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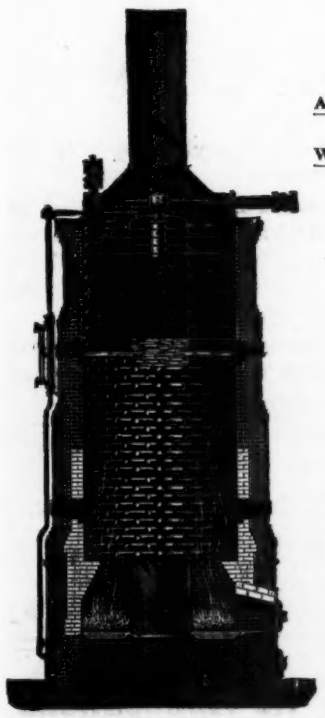

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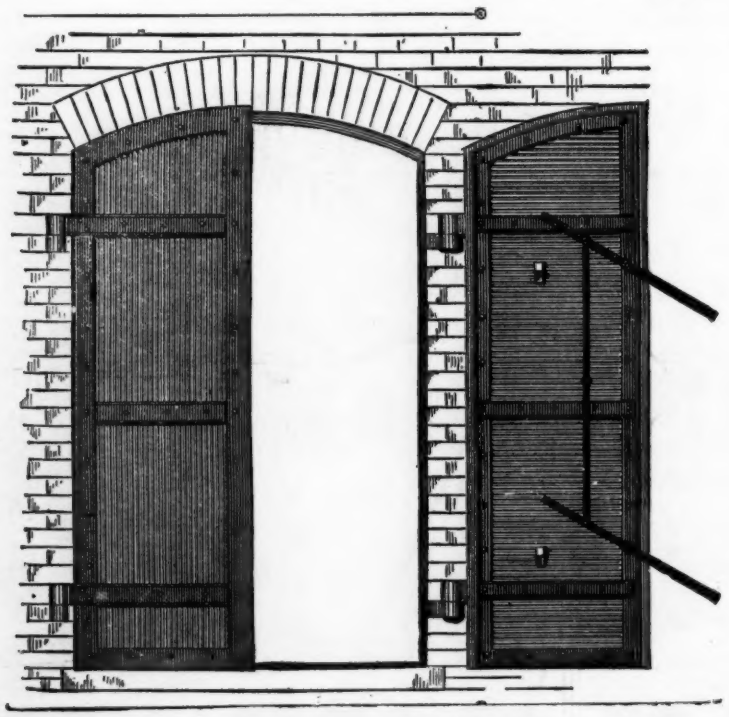

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GAS.

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Dear Sir—In accordance with your request, I have made several tests of the new Welsbach mantel (called No. 169) for candle power and efficiency, and I herewith submit the following results:

	Candle Power.	Pressure.	Gas Consumed.	C.P. per Cu. Ft.
Average of Test No. 1,	67.05	.95 in.	2.6	25.70
" " No. 2,	63.86	1.00 in.	2.86	22.30
" " No. 3,	72.50	2.1 in.	2.87	25.26

The above averages are the results of trials on three different occasions, and in each case the mantles tested were made from a different lot of fluid.

The mantles used in the above tests were selected at random, and all had been dipped in kristaline and dried ready for shipment.

It is quite possible that better results could have been obtained by manipulating and readjusting the position of the mantles on the galleries, and also by waiting a longer period after burning off the kristaline; but I considered such fine adjustment undesirable in determining the commercial candle power.

These tests were made on a bar photometer against a regular Edgerton standard slit. The candle power of the slit was 6.18, and the gas used was Gloucester City water gas, 26 candle power.

Very truly yours,
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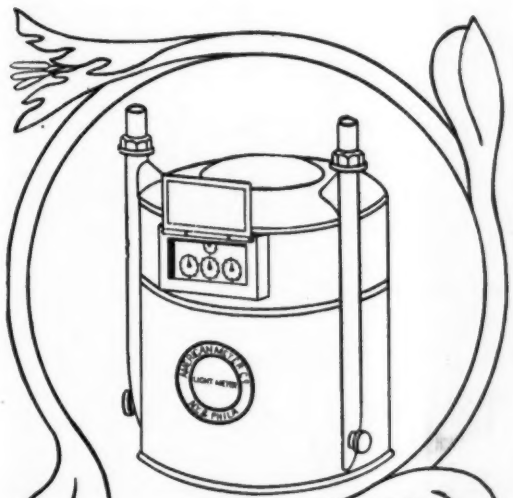

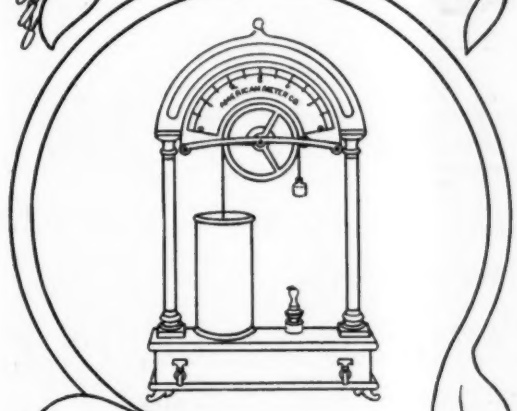

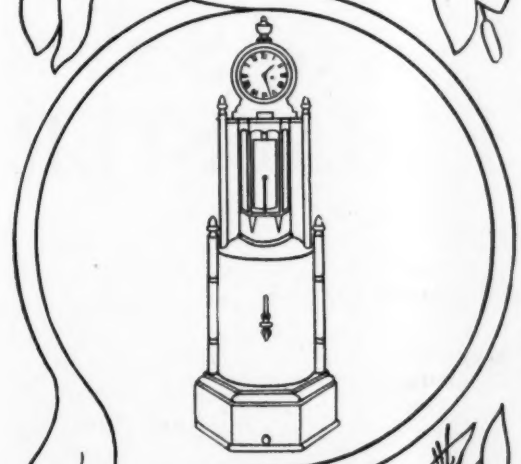

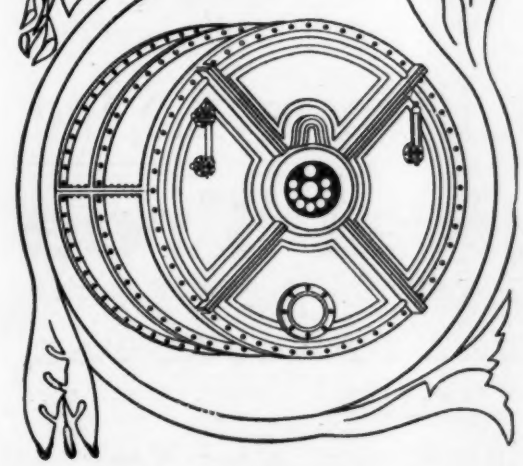

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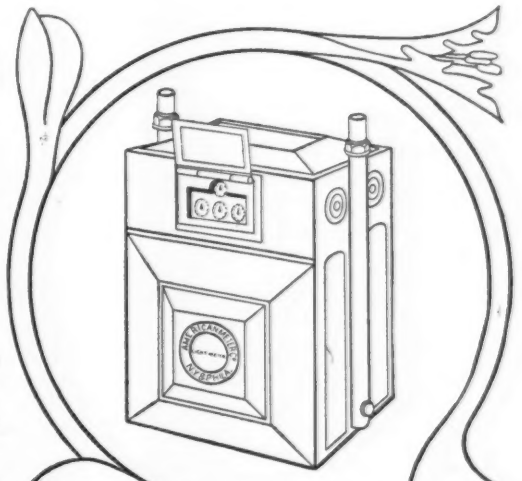
PUBLIC LIGHTING TABLE.

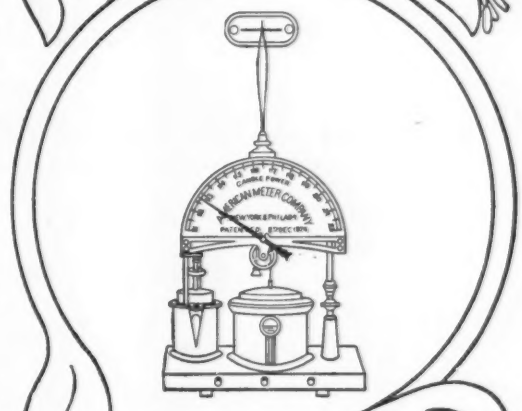
AUGUST, 1893.

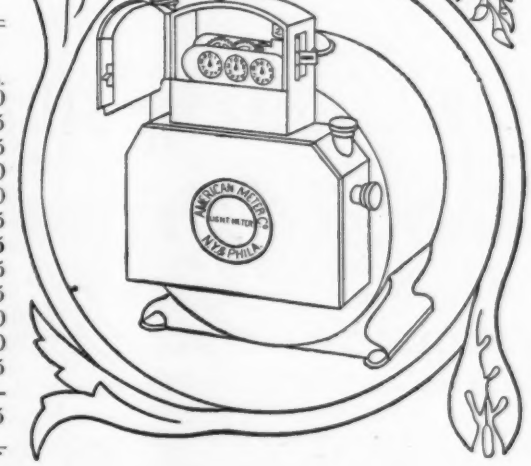
Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguish.
				P.M.	A.M.
Tue.	1	7.40 PM	10.30 PM	7.10	3.30
Wed.	2	7.40	10.50	7.10	3.30
Thu.	3	7.40	11.10	7.10	3.30
Fri.	4	7.40 LQ	11.40	7.10	3.30
Sat.	5	7.40	12.10 AM	7.10	3.30
Sun.	6	7.40	1.00	7.10	3.45
Mon.	7	7.40	1.50	7.10	3.45
Tue.	8	7.40	4.10	7.10	3.45
Wed.	9	7.40	4.10	7.10	3.45
Thu.	10	7.40	4.10	7.10	3.45
Fri.	11	7.30 NM	4.10	7.10	3.45
Sat.	12	7.30	4.10	7.10	3.45
Sun.	13	7.30	4.10	6.55	4.00
Mon.	14	7.30	4.10	6.55	4.00
Tue.	15	7.30	4.10	6.55	4.00
Wed.	16	8.30	4.10	6.55	4.00
Thu.	17	8.50	4.10	6.55	4.00
Fri.	18	9.20	4.10	6.55	4.00
Sat.	19	9.50 FQ	4.20	6.55	4.00
Sun.	20	10.30	4.20	6.45	4.10
Mon.	21	11.10	4.20	6.45	4.10
Tue.	22	12.10 AM	4.20	6.45	4.10
Wed.	23	1.10	4.20	6.45	4.10
Thu.	24	2.10	4.20	6.45	4.10
Fri.	25	No L.	No L.	6.45	4.10
Sat.	26	No L.	No L.	6.45	4.10
Sun.	27	NoL. FM	No L.	6.30	4.20
Mon.	28	7.10 PM	8.30 PM	6.30	4.20
Tue.	29	7.10	8.50	6.30	4.20
Wed.	30	7.10	9.20	6.30	4.20
Thu.	31	7.10	9.40	6.30	4.20

TOTAL HOURS LIGHTING DURING 1893.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January...	217.30	January...	423.20
February..	200.30	February..	355.25
March	177.50	March	355.35
April.....	160.30	April.....	298.50
May.....	149.00	May.....	264.50
June.....	140.30	June.....	234.25
July.....	143.40	July.....	243.45
August....	154.50	August....	280.25
September.	171.50	September.	321.15
October....	202.20	October....	374.30
November.	221.30	November.	401.40
December.	248.50	December.	433.45
Total..	2188.50	Total..	3987.45







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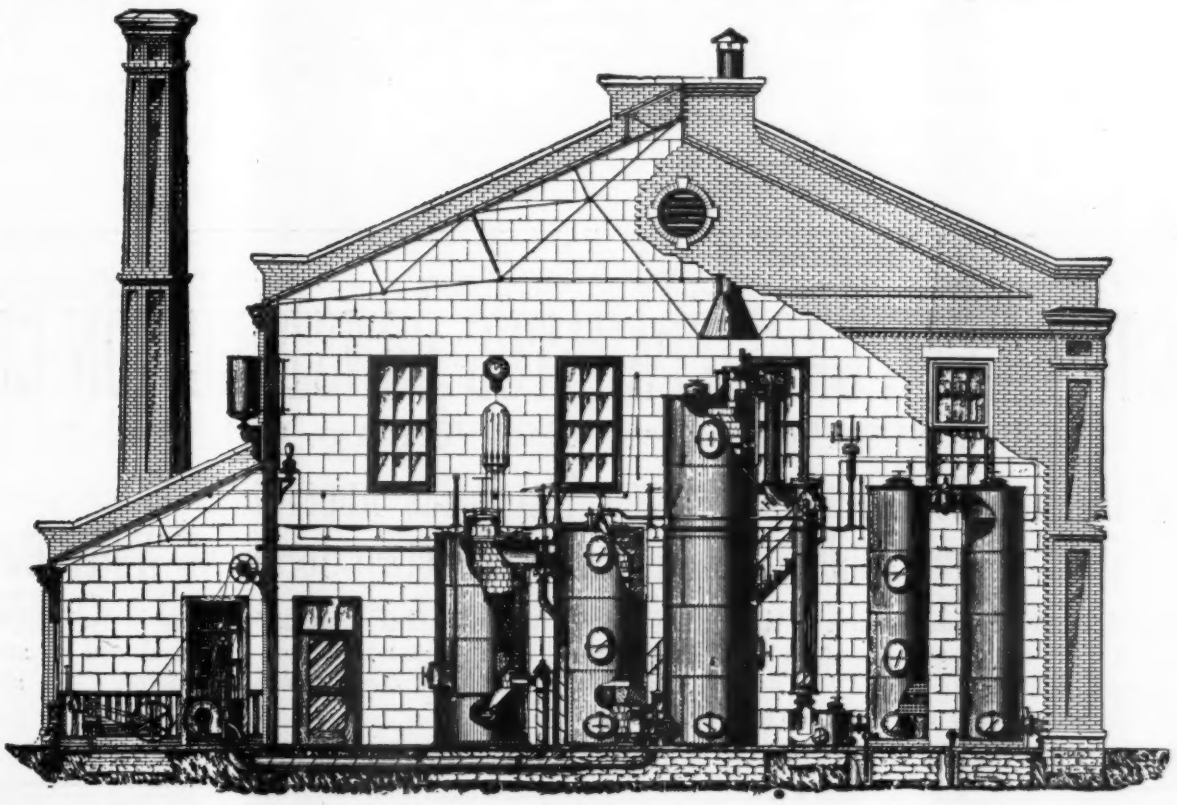

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Gentlemen—We are in receipt of your favor of the 16th, advising us the National Gas Light and Fuel Company, of Chicago, will discontinue their advertisement from July 1st, and offering us the space occupied by them since 1885.

In thanking you for remembering us and for your kind expressions, it affords us great pleasure to advise you that we have decided to accept your proposition, as we fully realize the excellent advertising facilities afforded through the GAS LIGHT JOURNAL. In doing so we are also complying with repeated suggestions from the many friends we have gained in the fraternity, who have tried us with their orders. Our previous hesitancy in extending our advertising was due to the fact that, with our best efforts, we were unable to increase our facilities to meet the growing requirements; but with our new shop, to be completed this month, and which is being fitted up with special tools designed for the finishing of Gas Apparatus, we feel confident of being able to turn out all work intrusted to us promptly and in a first-class manner. We have taken the precaution to provide for any future extensions which may prove necessary. We now hope to extend our business relations with the fraternity, and will do our best to deserve it by prompt and first-class work and reasonable prices.

Yours very truly,
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By O. N. GULDLIN, Prest.

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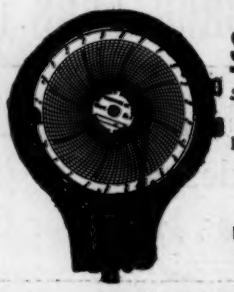

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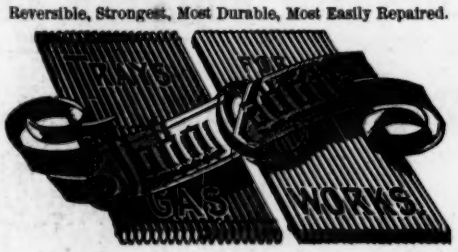

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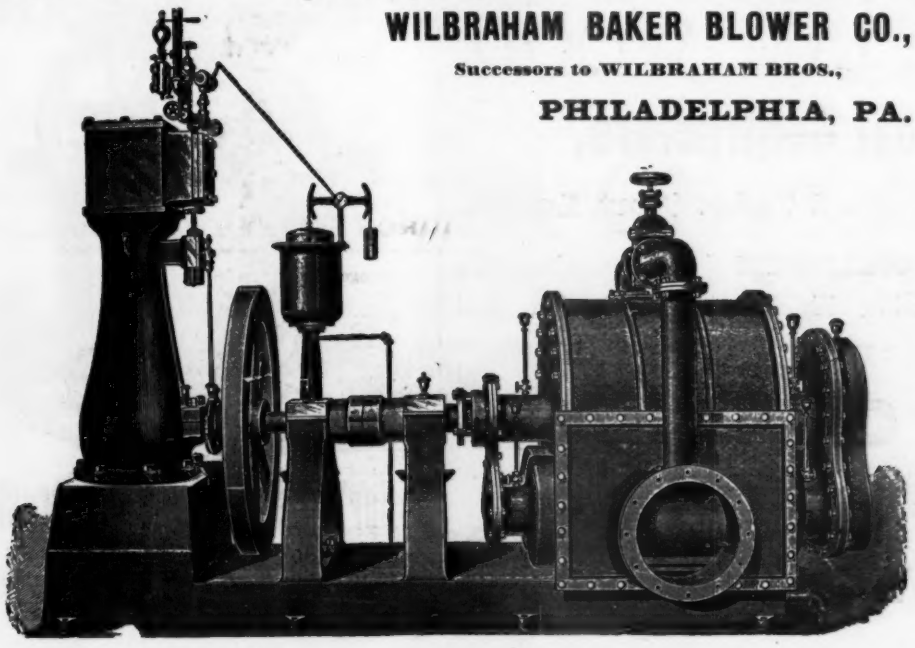

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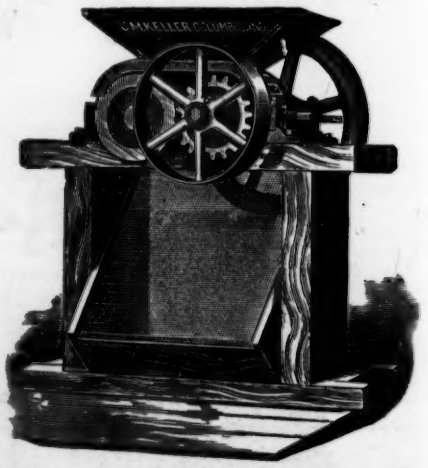

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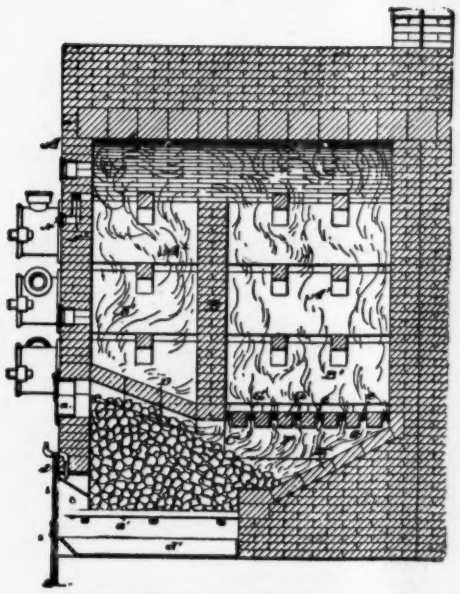

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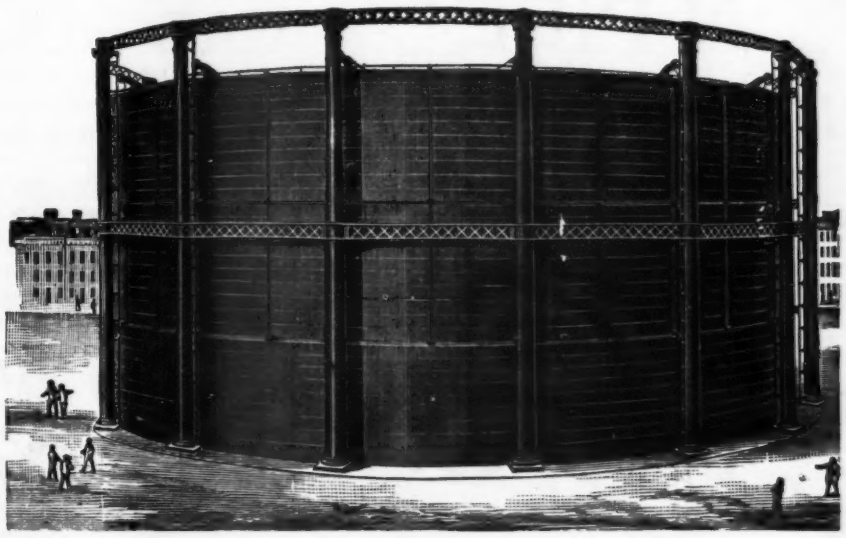

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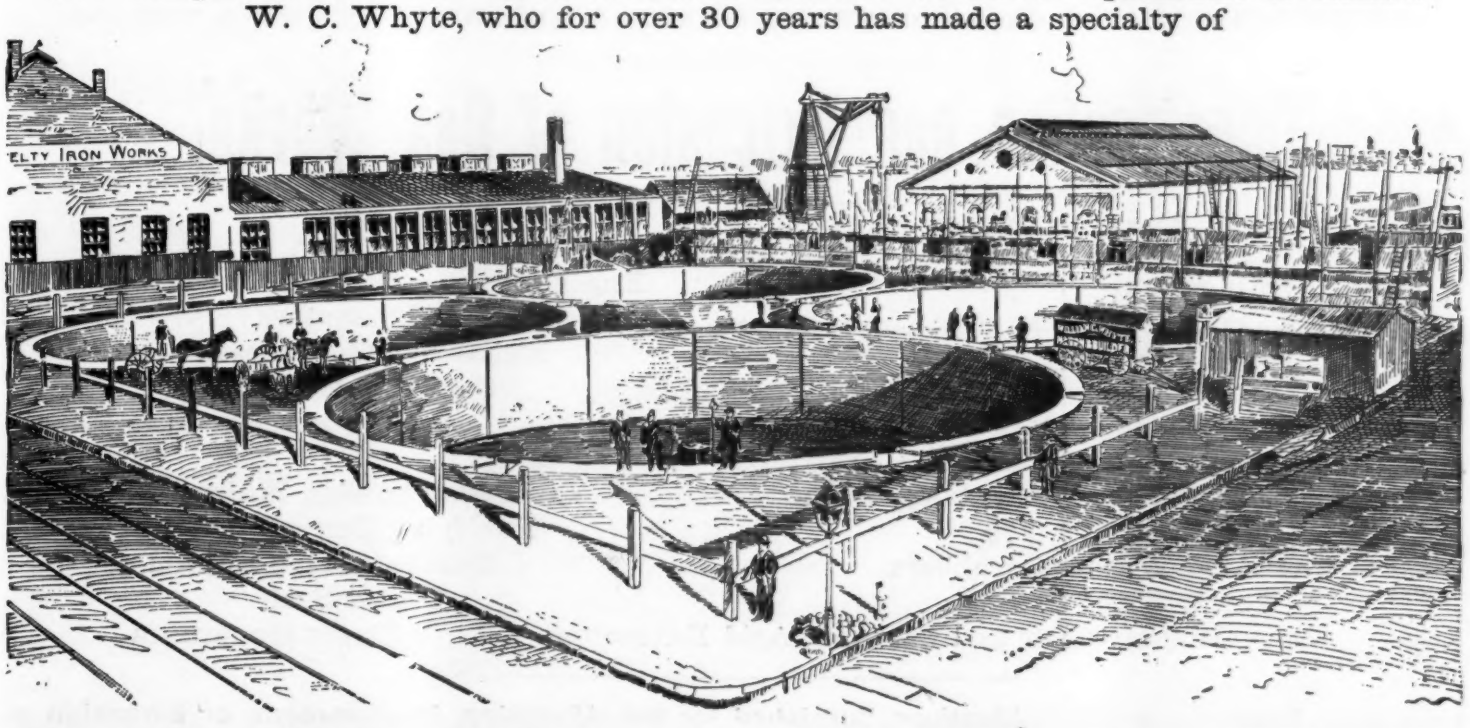

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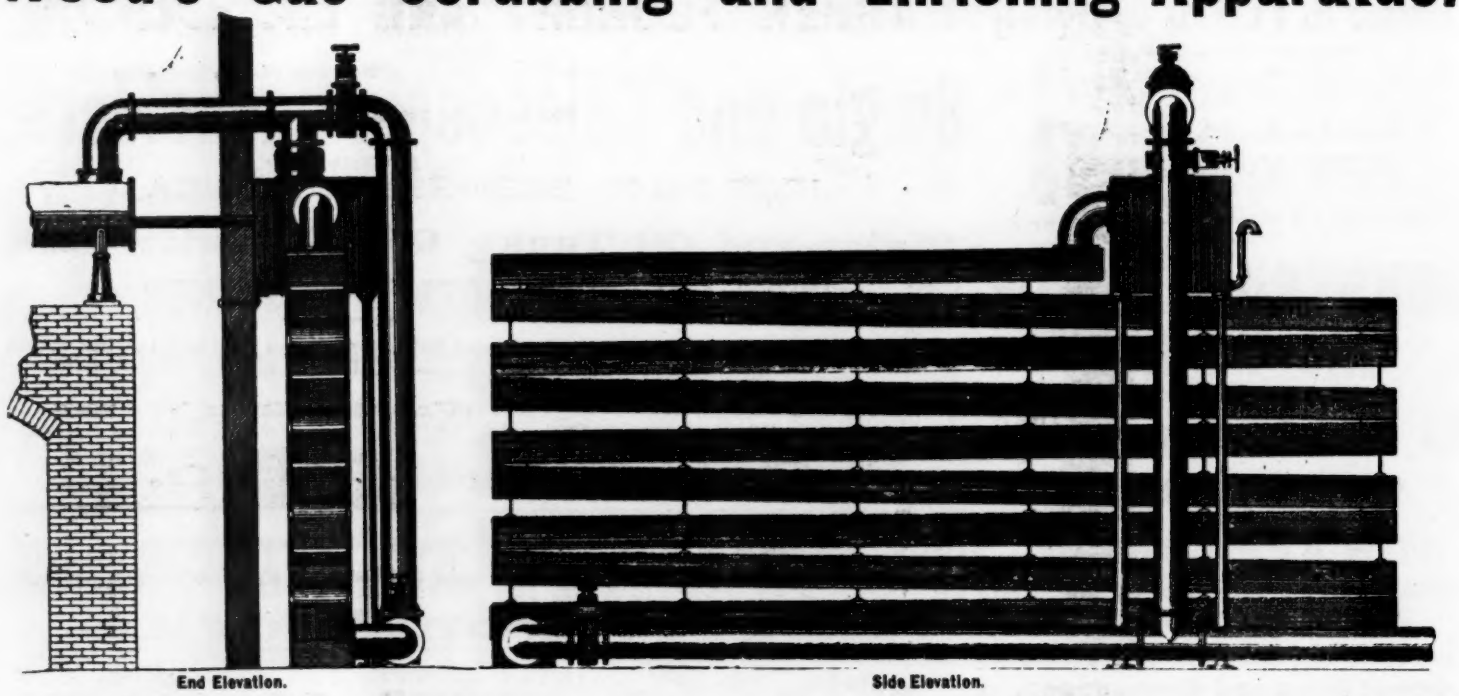

End Elevation. Side Elevation.

The cheapest, simplest, and most effective apparatus for removing Tar and Ammonia, and enriching Gas, ever brought to the attention of Gas Manufacturers. With ordinary condensers and scrubbers the condensable illuminants flow off to the tar wells and liquor tanks and are lost, but with Wood's Apparatus these illuminants are saved and retained in the gas, thus increasing its illuminating power and making a great saving in the cost of enriching material. Where set up next after the Hydraulic main, this Scrubber produces an 8-oz. Ammoniacal Liquor.

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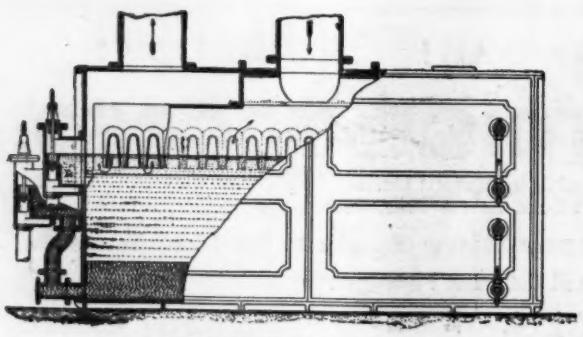

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More than **300** in Use.

REMOVES ALL THE TAR AND A LARGE PART OF THE CARBONIC ACID.

Ask the Brooklyn Gas Company, the Bridgeport Gas Co., the Brooklyn Gas Co., the Nassau Gas Co., the Providence Gas Co., the Trenton Gas Co., and a number of others which we can't name for want of space, if IT won't.

GEORGE SHEPARD PAGE'S SONS,

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For the Year 1892.

An Analysis of the Accounts of the Principal Gas Undertakings in England, Scotland, and Ireland. Being the Twenty-third Year of Publication. Compiled and Arranged by

JOHN W. FIELD, Accountant to the Gas Lt. and Coke Co., London.

Price, $5. For Sale by

A. M. CALLENDER & CO., - No. 32 Pine Street, N Y City.

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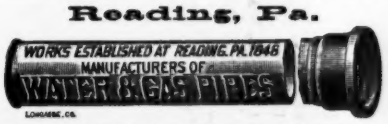

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Cast Iron Gas & Water Pipe,

BRANCH AND SPECIAL CASTINGS.

Gas-House Bench Castings, Hydraulics, Lamp Posts, Flange Pipe and Specials, Architectural Castings, Building Columns, Joists, Cellar Grates, Sash Weights, etc.

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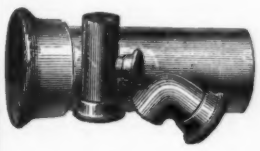

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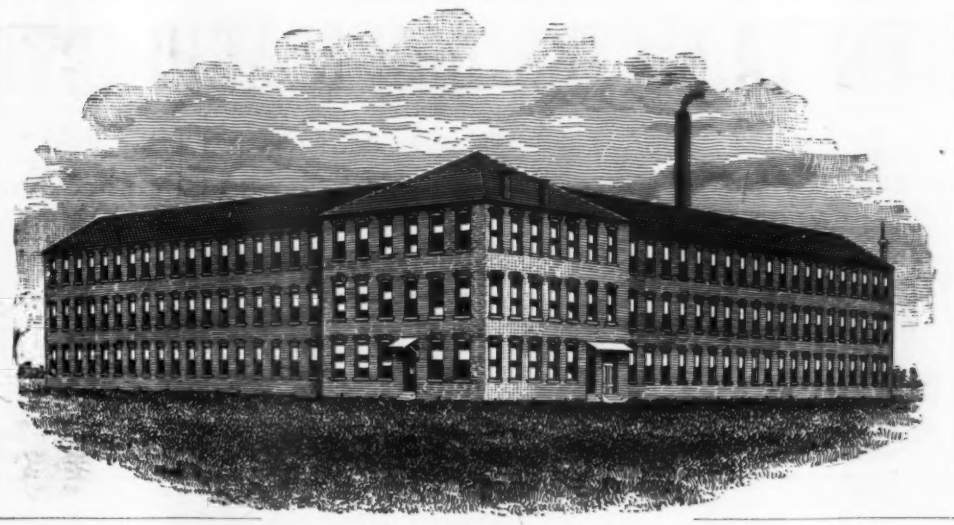

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Special Attention Paid to REPAIRING METERS OF ALL MAKES.

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Station Meters of any Capacity.

Test and Experimental Meters, Pressure Registers, Pressure Gauges.

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Apparatus for the Chemical Testing of Gas and Gas Liquor.

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"Success" and "Perfect" Gas Stoves.

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Pressure and Vacuum Registers, Gauges, Photometers, Drip and Bell Pumps, Etc., Etc.

PROMPT ATTENTION GIVEN TO ALL ORDERS. METERS THOROUGHLY REPAIRED. ESTIMATES FURNISHED FOR STATION METERS OF ALL SIZES. CORRESPONDENCE SOLICITED.

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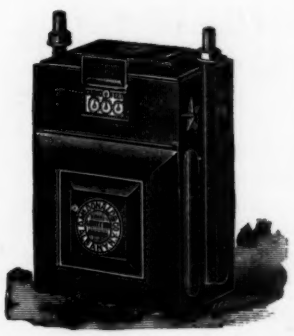
Center Seals, Pressure Registers, Governors, Indicators, Photometers, and all other kinds of Apparatus for use in Gas Works

FOULIS' PATENT STATION AND DISTRICT GOVERNORS.

REPAIRING DEPARTMENT.—We employ a special force of skilled workmen repairing meters of **all makers.**



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51, 53 & 55 Lancaster St., ALBANY, N. Y.
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Meters of all makers Thoroughly Repaired.

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SPECIAL.—Having purchased the sole right to manufacture and sell meters with the HEARNE IMPROVED VALVE, in the U. S., we respectfully solicit orders for the same.

The superior feature of this meter is that it avoids the danger of displacement of the valves, and consequent loss of gas, either in shipping, handling, or by dishonest consumers.

To designate from the regular Glover Meter, also made by us, we style the above the HEARNE-GLOVER Meter.

It is worth your consideration.

Full descriptive circular sent on application.

$10,500,000

Is the estimated value of Gas consumed per year by

35,000 "OTTO" GAS ENGINES

NOW in use . . . . . .

To what extent does **Your Company** participate in this amount?

If you have not reached out for your share, it is time **now** to do so—for many good reasons:

1st. Because rates on Electric current are on the increase.

2d. Because improvements in our "Otto" Gas Engines have been wonderful and numerous, and have cheapened their cost.

3d. Because prices for Gas are lower than ever before.

4th. Because you can therefore make a price for Fuel Gas sufficiently low to leave you master of the situation as regards competing systems of power—steam or electricity.

WILL IT PAY?

Mr. Thomas Fletcher, well known in the Gas Industry, gives his opinion on this question as follows

"It is essential for economical working, and consequent low prices, that the plant as a whole shall be utilized as far as possible for the whole 24 hours every day, summer and winter alike. If this ideal state of things could be attained, about three or four times the output could be sold with practically no addition to the capital expenditure, *and consequently the profits would be increased to four or five times the present amount*, or even more, as the staff expenses would not rise in proportion, an account of £25 being quite as easy to deal with as one of £5, and requiring no additional office work. Instead of being the best customers, *shopkeepers* and *owners of large works* are really *the worst* the gas industry has to deal with, spite of the large total amount, and the reason is simple. The consumption is enormous during two or three hours in winter, entailing the necessity of enormous holders and very large distributing plant, all of which is absolutely idle during the summer. THE BEST OF ALL CUSTOMERS ARE THOSE WHO USE GAS FOR ENGINES, workshop and industrial purposes, as these will use a steady supply for about ten hours daily, winter and summer alike, and *these are the users worthy of the greatest consideration.* Next to these come the users of gas cooking appliances and gas fires, they also being practically steady users for long hours both in the winter and summer. Domestic lighting does not come out anything so favorably, as the consumption in the winter averages over double that in the summer, entailing the loss on idle plant during a large portion of the year. The dream of the gas engineer is a large summer and 'day gas' consumption, and on *these depend large profits and economical working.*"

REDUCED PRICES AND FULL PARTICULARS ON APPLICATION.

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